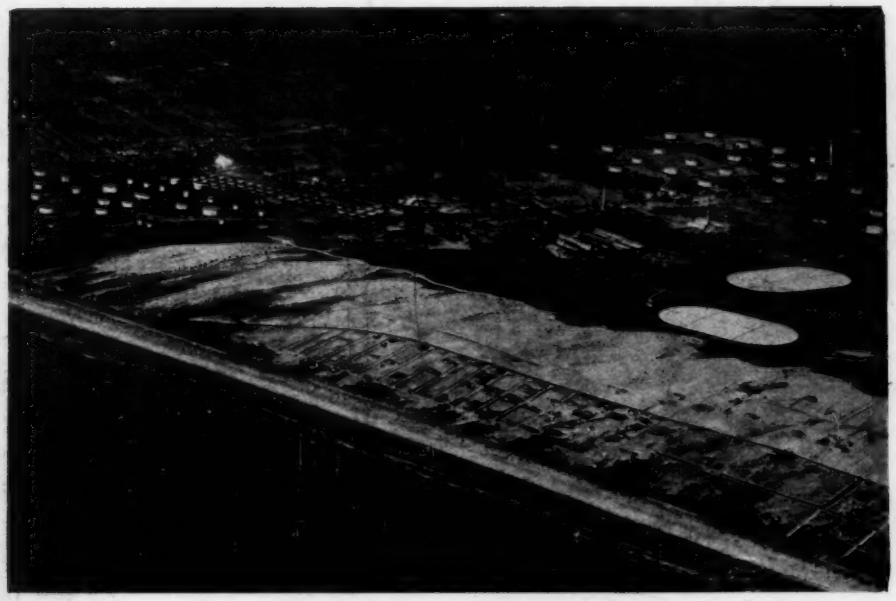
THE REFINER AND NATURAL GASOLINE MANUFACTURER

IN THIS ISSUE

Electrical Discharge for Producing Naphtha. Page 7.
Mexican vs. Mid-Continent Gas Oils. Page 9.
Standard Loses Again in Saybolt Fight. Page 20.
Determining Sediment in Fuel Oil. Page 12.
Comparison of Paraffin and Asphalt Lubes. Page 13.

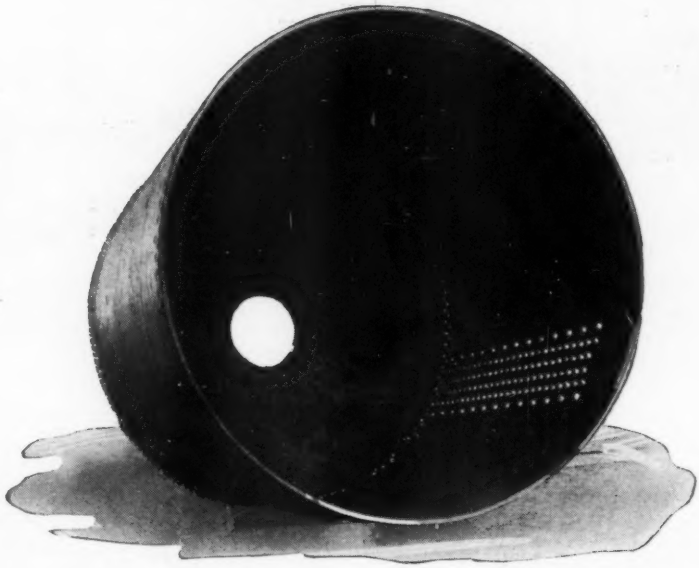
Vol. 1 No. 3 NOVEMBER, 1922 $1.00 Per Year



Standard Oil Company's El Segundo (California) Refinery from the Air

P.I.W.

STEEL PLATE CONSTRUCTION



P.I.W. Refinery Equipment Stands Up

"The TANK BUILDERS" have been building sturdy steel plate products for America's leading oil refiners for thirty years.

Guided by our ideal of integrity in steel plate construction, it has always been our aim to build Oil Refinery Equipment that STANDS UP under the most rigorous and exacting service requirements.

We show above an inside view of a specially constructed gasoline still built to rigid specifications for a large gasoline manufacturer.

"It Is P. I. W. Service and P. I. W. Service Is World Wide"

The Petroleum Iron Works Company

SHARON, PENNSYLVANIA

New York St. Louis Tulsa Houston Casper Tampico San Francisco

P. I. W. Steel Plate Products are used in the Petroleum, Gas, Mining, Railway, Iron and Steel, Water Works, Engineering and Allied Industries

XUM

Insulated Tank Car, Natural (Casinghead) Gasoline, built for The Chestnut & Smith Corporation, Tulsa, Oklahoma.

Caged Lightning

While prehistoric man was carving rude pictures on cavern walls, the alchemy of nature was busily distilling from buried forests huge supplies of liquid dynamite, the giant elemental force of Gasoline.

Today a marvel of industrial chemistry transports gasoline in its most volatile and hazardous form—Natural (Casinghead) Gasoline—alike through desert sands or snow capped peaks, securely shackled and subject to the will of man.

The type of insulated tank car illustrated above carries Natural Gasoline 6,000 miles through varying climates with an inside temperature variation of less than 1°. Its special "thermos-bottle" construction saves 75% of the outage occurring in non-insulated tank cars. It originated in General American shops and over 96% of such tank cars in use are General American-made.

Designing, building, re-building and repairing all types of tank cars, for all liquid commodities that can be shipped in bulk, General American engineers are enabled to apply new and improved principles of construction from year to year. Their highly diversified experience is an advantage to tank car buyers.

The Corporation maintains a fleet of over 12,000 tank cars operating under lease to various concerns. A letter brings a representative prepared to go into the details of your tank car problem, without obligation to you.

GATX GENERAL AMERICAN

GENERAL AMERICAN TANK CAR CORPORATION

General Offices: 111 W. Monroe St., Chicago, Ill.
Sales Offices:
17 Battery Place, New York
311 California St., San Francisco

GENERAL AMERICAN

XUM

This Handy Note Book

In Exchange For A Few Minutes of Your Time

Every now and then we receive enthusiastic letters from some of our customers telling about the unusually fine service Homestead valves have given them. We believe there are other Homestead users who have interesting stories to tell about our Quarter-Turn and Blow-Off Valves. Homestead customers are almost universally Homestead boosters and like to hear about the fine records our products are making.

This Is the Kind

Homestead Valve Mfg. Co.
Homestead, Pa.

Gentlemen:—When one of your valves was placed on the discharge pipe of an air compressor at our furnaces, some doubt was expressed as to whether the valve could be successfully operated under the temperature of air compressed to 100 pounds pressure.

I wish to mention that the valve not only worked perfectly under these conditions, but also on several occasions, when the oil from the air cylinder had settled in the pipe around the valve and had become ignited. .I do not know what the temperature of the valve was under these conditions, but the pipe on both sides of it was of a dull red heat, which would be somewhere in the neighborhood of 932 degrees. While in this state the valve was easily shut off and opened again, thus removing any doubt about its operation under high temperature.

Very truly yours,

(Signed)*.....

M. E.

*Name and address on request.

So we are in search of similar letters for use in our advertising.

That you may not go to the trouble of writing this letter without some compensation, we will be glad to send this handy 3" x 5" note book with detachable filler, in exchange for a letter telling of interesting cases of Homestead superiority. Please state your name and address, and pressures, temperatures, uses, whether gases or liquids used in lines, and what kinds, etc.

How about it?

Write for that note book today.

HOMESTEAD VALVE MANUFACTURING CO.

138 SIXTH AVENUE HOMESTEAD, PA.

HOMESTEAD

OFFICES AT
1507 First National Bank Bldg., Pittsburgh
423 First National Bank Bldg., Chicago
225 Atco Bldg., Tulsa
426 Douglas Bldg., Los Angeles
201 City National Bank, Wichita Falls

The REFINER and NATURAL GASOLINE MANUFACTURER
Published Monthly by GULF PUBLISHING Co.
Houston, Texas

For men engaged in the operating branch of the refining and natural gasoline business.

Vol. I November No. 3

R. L. DUDLEY..Manager
F. N. WILLIAMS..Editor

Price .....$1 per year

Advertising rates upon application to nearest office.
Copyrighted by the Gulf Publishing Co., 1922

Refining vs. Sales Department

THE other day a man connected with "One of the Biggest" oil companies was talking about some of the policies of his organization, and how these policies have gone over, throughout the world. He was commenting on the relation between the various departments of a big oil company, a company representing all departments of the industry. And he went right to the core of a highly important question of administration, when he said:

"This company is built around a central unit,—the refinery. The producing department produces the oil for the refinery, and the sales department markets what the refinery delivers to it. The Refinery is the heart of the whole corporation, and every department or branch is working **towards** or **away from** the refinery."

"Now personally, I think that is wrong", he continued. "I believe that the pivotal point of the whole organization ought to be the sales department. It is this department which has contact with what is necessary to meet and overcome competition. It is through the sales department that the customer, the consumer, the public is reached. If the consumers' preference is not met by one company, they will switch to another company's goods. By coming up against the buyer every day, dozens of times a day, the sales department knows what the buyer wants, what he will take, and why he will take that instead of something else. In other words he knows how to anticipate demands."

There you have two views of a question of administration which are of some consequence. Does your sales department work for the refinery, or does the refinery work for the sales department. Are your goods made to order, or do you make what is easiest or quickest or cheapest to make, and throw upon the sales department the burden of selling what you make? Does the manufacturing branch of your business ever take suggestions from the sales branch, or does the sales branch take explanations from the manufacturer?

The oil industry is in a position which is different from that of most industries, in that it cannot completely change the nature of the products it has to offer for sale. Variations in demand may make radical changes in the output of most manufacturing concerns. A sudden miraculous demand for steel rails may turn every mill to making steel rails, while a sudden miraculous demand for pine shingles might turn every lumber mill to making shingles. In each instance the momentum of the industry could be kept up while the nature of the output would be changed, or concentrated on one product.

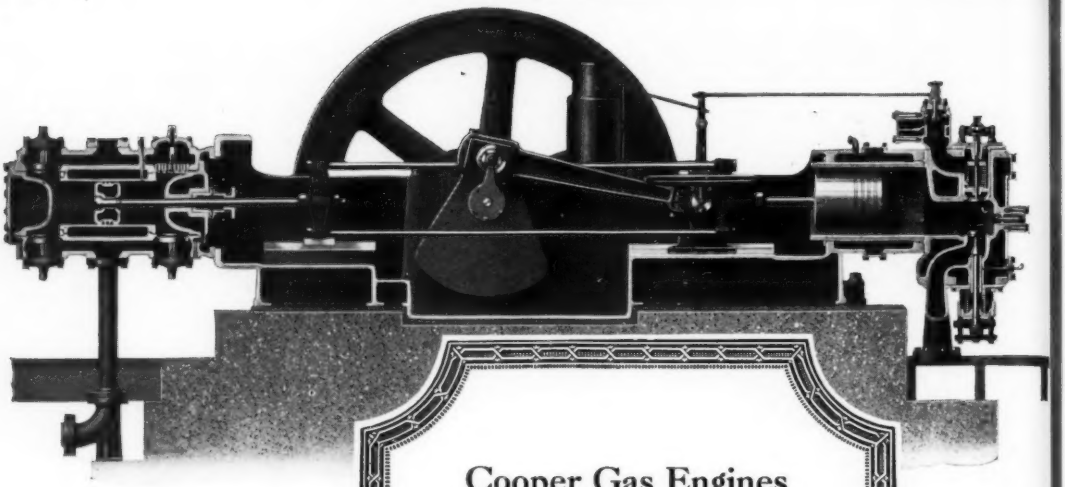
But a sudden demand for Kerosene, for example, could be met only by producing proportionate amounts of other refined products. The range for variation between the amount of the various products coming from the refiners, is short. However, there is sufficient range to permit of wide variations in quality and in the grade of the products themselves, without changing the products, as such. It is this variation which brings the one big task to the door of the sales department.

It is possible that the sales department may discover that the Great Magic Company's gasoline is losing its popularity, because it is cut too low, or maybe because it is too high gravity. Of course the Great Magic company will find out the same thing when sales begin to drop down. But if the sales department is given enough leverage, it may be able to avert the blow, by asking the refinery to make a change in the gasoline to meet a new demand. And it is a recognized fact that new demands do develop, and that taste changes. The sales department is in position to detect these changes first.

On the other hand, it is argued that the demand for petroleum products has been ahead of supply, and that the one important problem is to get as much marketable material from a barrel of crude as possible. And it is held that the changes in price of the various refined products can be used to determine which way the demand is going. If kerosene, for example again, is running higher in price, it is easy to cut a little higher and produce a little more kerosene, etc.

This same argument is met by the sales department in pointing out that the changes in price are reflections of increased or decreased demand, and that this demand could be anticipated by the sales force, and the amount of such products increased to meet that demand, without waiting for it to upset the scale of prices. And they argue that a stability of market price schedules is beneficial to the organization.

Any generalization upon the importance of one department over the other, could be only partly correct, as generalizations usually are. Yet it stands out that during the past years the industry has suffered by virtue of overproduction of certain particular products of petroleum, while meeting the demand for other products. If the sales force, or any other force could have anticipated this condition, and could have averted it by having the manufacturing branch alter its processes and proportions so as to increase the product most in demand and decrease the amount of the product in less demand, then that would have been a worth while service.



Cooper Gas Engines For Economy

Oil and Gas Engineers throughout the country are advocating the Four-cycle Gas Engine because it will operate on at least 50 per cent less gas than the best designed two-cycle engines. The direct connected feature with its 20 per cent power saving, the separate mixing valve for each cylinder, the simple and accessible outside layshaft, the efficient oiling system and abundant water cooling capacity will thoroughly convince you of the desirability of these engines for main line, booster or gasoline station work. If you have not already received a copy of the 80 and 160 B. H. P. Bulletin, a postal will bring one to you by return mail.

Cooper Gas Engines are built in standard sizes for Direct Driving Cooper Plate Valve Compressors in four-cycle single-acting types from 80 to 160 B. H. P. and in double-acting tandem types from 250 to 1300 B. H. P.

The C&G COOPER CO.

MT. VERNON, OHIO

Kirby Bldg., Dallas, Texas; 50 Church St., New York

Since 1833 Engineers and Builders

Producing Naphtha From Heavier Distillates

Use of the silent electrical discharge in breaking down heavy hydrocarbons

By J. V. Meigs and E. J. Ford
Boston College

The process herein described refers to a method for breaking down heavy hydrocarbons into simpler ones by passing through the vapors the so-called "silent electric discharge," i. e., applying electrical energy directly to the oil vapors. When first brought out, the method was looked upon as fanciful, by some, and no doubt may have caused many practical refiners to smile broadly. As time goes on, however, it is not unlikely that more thought may be devoted to the inherent possibilities, particularly as the applications of the electricity continue to grow and develop. If the fire hazard of the process can be controlled and the same carried out where cheap electricity is available, it would seem that a new field of effort in the development of "cracking" may be opened up.

Many cracking methods have been proposed differing both in detail and in principle but broadly speaking and without due consideration of their relative merits, cracking processes are generally under five heads—

1. The cracking of gas oil in the liquid phase.
2. The cracking in vapor or gaseous phase.
3. Catalytic processes.
4. The cracking of oil with the use of steam, hydrogen, methane, etc.
5. Combinations of all four processes.

Many of these are for some reason or other considered objectionable, either on account of the irregularity of the distillation, the waste of heat in conducting the cracking process, the production of uncondensable gas, poor yield and quality of naphtha and other disadvantages. The problem ultimately resolves itself into a method of breaking down heavier distillates such as gas oil, etc., in naphtha without troublesome carbon deposits, with a high yield of light naphtha of good quality, and the accomplishment of these results with low overhead costs. The principle of the methods referred to herein consists in a direct application of electrical energy to the oil vapors in the presence of methane or hydrogen.

Since the day when Sabatier attracted the attention of chemists to the powerful hydrogen-carrying properties of catalytic nickel, there have been numerous suggestions directed to the hydrogenation of petroleum distillates. It may be recalled that this observer developed a process for the reduction of a low spirit boiling below 150°C., (302°F.), which consisted in treating the vapors of the heavy oil with finely divided metals at a red heat and then attempting to hydrogenate the unsaturated product. In other processes the catalysts specified are metals such as nickel, cobalt, silver, paladium, chromium, and manganese, or their oxides.

The best of these methods give more or less continuous trouble and expense due to the poison of the catalysts by sulphur compounds or other impurities or by the deposition of carbon. Although some very efficient devices have been proposed for the ready removal of carbon whether as lamp black or coky carbon, nevertheless the cleaning is necessarily detrimental to the continuous operation of the process and where the oil contains sulphur, arsenic, or phosphorus, the catalytic process is in grave danger of becoming a nuisance.

Other processes depending on the application of heat to the hydrocarbons offer one of three main difficulties, namely, the production of a carbon deposit, a large amount of waste gas, and a highly unsaturated condensed product that is difficult to treat. It is commonly believed that high temperature makes for a high degree of unsaturation. On the other hand, when the cracking temperature falls below a certain point, the production of gasoline decreases so as to render the process profitless. To just what extent the presence of unsaturated hydrocarbons is objectionable, is a mater of dispute. It is true that these conditions may be and actually have been met by hydrogenating the unsaturated bodies, but this process seems to have proved rather too expensive for commercial use.

So far as is known definitely, it has not been until recently, that electrical energy used as a reducing agent has been applied to the problem of decomposing heavy oils to yield naphtha. Those methods that involve subjecting hydrocarbon vapors to bodies heated by the resistance offered to an electric current, are, strictly, cases wherein heat and not electrical energy is directly utilized. But the use of silent electrical or corona discharge, represents a promising method for making gasoline from gas oil which is thought to offer advantages over those depending on the application of heat alone.

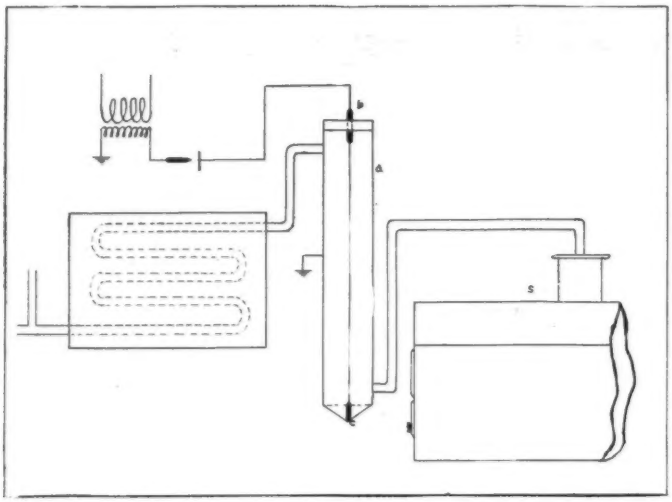
The method consists in passing mixtures of the vapors of heavy hydrocarbons and some gas containing hydrogen, such as methane (natural gas), or hydrogen itself through electrically-heated tubes, and therein subjecting the vapors to the silent discharge of a high-voltage high-frequency oscillating current. Under certain operating conditions, kerosene, for example, is said to give an 84% conversion.[1]

The oscillatory discharge as used in the process is similar to that of a Leyden jar, consisting of electric surges first in one direction and then in the other. The first rush of current surges beyond the condition of equilibrium, and a reverse charge follows, and so on,—until after a few surges the decreasing oscillations cease. Incidentally, these oscillations in a train of electric impulses of radio frequency constitute the operative principle of wireless telegraphy. In the process herein described the oscillations are made to cause an increase in the electrical conductivity of gases. All gases under normal conditions of temperature and pressure are extremely poor conductors of electricity. But when a potential difference is established between two points in a gas, the gas is put under a stress. As the stress increases with potential difference, the accumulation is carried off as a silent discharge. The increase of conductivity of the gas is due to the presence of some kind of electrically charged particles mixed with the gas, and these are called ions. They are produced in pairs, and have respectively equal charges of opposite sign, as in electrolytic dissociation. The gaseous ions recombine by mutual attraction when they come within the sphere of each other's influence. Their electric charges are then neutralized and they appear as molecules.

The theory of ionization would lead us to expect a sudden increase in pressure when the gas is suddenly ionized. Some particles in the gas would be split up by collisions and each of the constituent parts would act as a separate molecule as far as its contribution to the total pressure is concerned. This has been established by experiments, and it is a matter of common knowledge that under the action of the electric field the inner cohesion between the positive and negative ions is weakened within the neutral molecule; and in consequence of this weakening, it follows that a smaller amount of kinetic energy will be required for the process of ionization. Let us suppose that we have to do with a gas having no free ions and from which all ionizing influences are removed. When acted upon by a high voltage, theoretically there ought not to be any discharge produced in that gas, no matter how high the tension may be. Of course, it is hardly possible to be certain in concrete cases that all sources of outside ionization are actually absent, in view of the omnipresence of radioactive substances, but if all such substances were removed a certain tension higher than usual would produce a discharge in the gas.

In the process under consideration hydrogen gas is passed through the oil heated in a still to a degree or two below its boiling-point under the required pressure, thus furnishing a means for perfect control of the velocity through the reaction tubes. The gas acts as a carrier for the oil vapors. The reaction tubes wherein the gas and oil vapors are subjected to a high-voltage oscillatory high-frequency current, may be vertical steel tubes, (see a in the diagram), the length determining in a remarkable degree the percent of conversion. Tubes 34 feet long are said to give a conversion efficiency approaching 100%. These tubes may be heated externally by induction by a coil of copper wire embedded in a fire-proof inculating compound, and through this coil an alternating current is passed having a frequency of 60 and a voltage of sixty. A discharge electrode is located axially in the tube from highly insulated supports at the end, b and c. This central wire is connected to one pole of a high frequency alternating oscillatory generator, having a voltage of 15,000 to 250,000, with a current strength of 3 to 5 amperes. The frequency is controlled by variable condensers. The high-voltage high-frequency discharge passes radially from the central

[1]Cherry, Trans. Am. Electrochem. Soc. 1917 (32), 351. Davidson and Ford, Chem. Abs. 1917, 2274.



to the steel tube which is grounded, and the electric current thus flows at right angles to the stream of petroleum and gas vapors which passes through the tube from the still s.

The hydrocarbon vapors are cracked by the combined action of the electric discharge, pressure, and heat, and the reaction products pass out of the tube into a condenser d, where the liquids are collected and the excess of methane or other hudrogen-carrying gas is separated to be used again for saturating the oil vapors.

One important consideration is the claim that little carbon deposit has to be dealt with although the temperatures of the reacting gases are carried even as high as 480°C, (896°F.). Moreover, the product is said to be free from olefines and other ill-smelling compounds which are characteristic of ordinary cracked gasoline. This result is particularly favored by the temperature employed, that is, from about 380 to 550°C., (716 to 1022°F.). If the temperature is much lower than this, the cracking action becomes too slight to give a satisfactory yield. A good measure of the (saturated) value of cracked petroleum is the ration between its specific gravity and its boiling point. The product produced by electrical means gives a very low ratio, an indication of a gasoline of high hydrogen content, good quality, and one giving low refining losses.

The power consumption and costs are of particular interest. A total of 1512 kilowatt-hours in the reaction tubes is said to be necessary for the conversion of 1500 barrels of kerosene distillate. Adding to this the energy required for heating the reaction tubes, estimated at 41,340 kilowatt-hours for the same amount of raw material, the total energy required becomes 42,852 kilowatt-hours. At a cost of 3c per kilowatt-hour, the cost of electrical energy for the treatment of 1500 barrels of kerosene is $1285.56, or approximately 85c a barrel.

The cost of hydrogen-bearing gas is a question of locality, principally. The use of methane offers distinct advantages where it is available in the vicinity of the refinery. Hydrogen, however, may be purchased at a reasonable price from a number of firms which produce it by the decomposition of water. In the opinion of the writers hydrogen instead of methane would mean a less complicated chemical reaction in the tubes. Superheated steam may be used in conjunction with the gas or alone. Artificial gas, containing hydrocarbon or hydrogen-carrying constituents may also be used. Assuming the distillate treated to have an average composition corresponding to the formula $C_{10}H_{24}$ (boiling at 287° to 291°C., 548° to 555°F., sp. gr. 775, 50.6°Be)[2], and yielding a cracked product corresponding to the formula C_5H_{12} (boiling at 125.5°F., 257°F.), the theoretical amount of hydrogen to effect the conversion of 1500 barrels of oil according to the equation, $C_{10}H_{24}+2H=2C_5H_{12}$ would be 215,000 cu. ft. at normal temperature and pressure, (0°C., 760mm.) For treating 500 barrels of distillate, with a 33 1-3% yield of Naphtha, instead of the theoretical 100% conversion, the amount of hydrogen is reduced to one ninth of the above or to about 24,000 cubic feet at 32°F. and 760 mm. pressure.

The fact that the yield of gasoline increases with the rise of frequency of the oscillatory discharge is of extreme interest. Apparently the effect of the high-frequency charge produces a disorganizing and reorganizing effect on the gases and oil vapors. And this reaction is said to be proportional to the frequency. High frequency produces low boiling compounds and indeed the higher the frequency the lower the boiling points of the hydrocarbons produced. The fact that by varying the frequency of the oscillatory current we may obtain reaction products of varying boiling points would seem to indicate some quantitative relationship between the rates of vibration of the molecules of the products and the frequencies of the electrical discharges. And while it is true that the frequency of molecular vibration is enormously higher than any electric-frequency at present available, it may be too much to suppose that the molecular vibration frequencies are multiples of lower harmonic electric frequencies.

The object is attained by subjecting the gases or vapors to electrical impulses of such high potential, as to produce a maximum ionization breaking up during short intervals of time. The effectiveness of high tension electrical discharge in accelerating the chemical reaction, can be increased by setting up in the discharge circuit surges or sudden impulses of high potential. [3]For this purpose a rectifier may be used, which causes sudden variation in the resistance of the circuit under conditions which will result in the production of an electric impulse with a steep wave front. Each impulse or surge is of short duration, so that the energy of the surge is applied to the gaseous medium at high potential during an extremely limited time, the high potential resulting in ionization and discharge while it lasts, and the shortness of the time preventing the ionization from causing a complete disruption. Apparently the impulses are of the nature of isolated surges in which practically all of the energy of each impulse is delivered and dissipated in a single wave and is not alternately stored and released as in the case of an alternating current. Mechanical rectifiers have been used, but they are expensive to install and to operate. An effective rectifier of the mechanical type has been produced, however, and successfully operated. Advantage is taken of the fundamental differences between carriers of positive and negative charges in the corona discharge through gases, and the selected action is produced by a blast of air, so located and directed as to facilitate the passage of the current in one direction and impede its passage in the opposite direction. By a proper manipulation of the force of the air current it is possible to produce an oscillating current of surges or impulses of a definite value.

The fact that with this process we find no appreciable amount of carbon deposited is unique. And since many other processes have been devised making use of the same conditions in regard to heat and pressure and have experienced a liberal deposit of carbon and the production of large volumes of noncondensible gases, it is reasonable to suppose that the corona discharge is responsible for this desirable improvement. And furthermore, it seems likely that under the proper conditions, for this reason, the conversion of hydrocarbons of high boiling points into gasoline and other low boiling commercial products should approximate 100%.

[2]The gravity is high since the assumption is that we are starting with a distillate that is fully saturated.

[3]Davidson and Ford; U. S. Patent 1,229,042, June 5, 1917.

Bossier Oil Contains All Lube Properties

The crude obtained from the R. L. Autrey lease, Bossier Parish, La., has, after ordinary acid treatment, nearly all the properties of lubricating oil. The production of the lease is 1,000 barrels per day from 14 wells the depth of which varies from 305 to 351 feet.

The crude tests as follows:

Gravity	19.0
Flash	180 F.
Fire	230 F.
Color	black-green

After treatment with 20 pounds of acid per barrel the color is 6½ and the viscosity about 1,000 Sayb. @ 100 F.

Mexican vs. Mid-Continent Gas Oils

Laboratory test goes deep into the relative values of the two products

By R. B. Harper

Samples of Mexican and Mid-Continent gas oils have recently been subjected to comparative tests in the laboratory of the Peoples Gas Light and Coke Company, by R. B. Harper, with the following result, as outlined by Mr. Harper:

In these tests an endeavor was made to determine all the important characteristics of the Mexican gas oil, particularly the following which may be said to be the items of essential interest in connection with the utilization of gas oil in the making of carburetted water-gas:

Contribution to the total heating value of the finished gas per gallon of gas oil used per million cubic feet of gas made.

Contribution to the sulphur contents of the crude and finished gas by the oil.

Deposition of carbon on the checkerbrick of a gas machine by the oil.

Conditions affecting the handling of the oil.

Other matters of secondary or minor interest in connection with the utilization of the oil in the manufacture of carburetted water gas were and are being investigated. However, owing to the time necessary for their completion, some of them cannot be considered in detail in this report but will be discussed in a final detailed report.

For the purpose of conducting the desired tests, three trained men were used on each of the three eight-hour shifts so that frequent tests of importance and interest could be made practically continuously day and night for the duration of each test period. On each shift, an older and more experienced technical employe in each group of three was placed in charge of the tests. During the day shift, a clerk was employed for the purpose of recording, totaling and averaging the test data obtained. The tests in general were made under the supervision of an expert.

Description of Gas Oils Tested

The gas oil first tested was a mixture of oils from various Mid-Continent crudes.

The Mexican gas oil was specially made from a Mexican crude oil of about 20° Baume at a large eastern refinery.

As will be noted from the accompanying chart the gas oil prepared from about 20° Baume Mexican crude oil consisted of practically all straight run distillate between 38° Baume to about 16° Baume or wax tailings at the worm, with the exception that the light portion (collected separately from the light worm), was rerun until the distillate showed 45° Baume at the form and the oil (called gas oil distillate or base) remaining in the still, and then mixed with the other distillate (obtained between 38° Baume and 16° Baume from the intermediate and heavy worms).

Description of Plant Equipment Used in Tests

The fololwing outline of the travel of gas through the various pieces of equipment at the station will serve to describe the most essential details of the parts of the plant used in the tests.

There are five gas generators all of the Lowe type, three shell, with double superheater, Nos. 1 and 2 gas generators are each 7′ 6″ in diameter, 13′ 3″ high and have a grate area of 22 square feet, while Nos. 3, 4 and 5 are each 8′ 6″ in diameter, 14′ 9″ high and have a grate area of 33.18 square feet.

The gas from Nos. 1 and 2 gas machines passes through two wet scrubbers (5 ft. diameter, 16 ft. high) connected in parallel, through three multi-tubular water condensers, in series (diameter 5 feet, height, 20 feet—181 tubes, 2″ diameter, 17′ long) and out to the relief holder (100,000 cu. ft. capacity).

The gas from the three 8′ 16″ gas machines (Nos. 3, 4 and 5) flows from a common header through two wet scrubbers (diameter 8′ 6″ height 21′ 2″) connected in parallel, through two multitubular water condensers, in parallel (diameter 8′ 6″, height 22′—305 tubes 3″ diameter 19′ 0″ long) and out into the relief holder through the same pipe that the gas from the 7′ 6″ generators enters the relief holder.

The works exhausters take the gas from the relief holder and send it through the two shaving scrubbers, in series (diameter 12′, height 30′—4 trays) then through a series of four purifiers (24′x24′x7′ 6″, 2 layers—total 2650 bu.) by split flow through the two station meters in parallel (12′ proved July, 1919) and out to the 2,500,000 holder.

Description of Tests Made

The following procedure was followed daily during each test period:

Twenty-four determinations of the total value of the make gas (at outlet of station meter) were made, or one each hour.

Three determinations of the total heating value of the make gas, after being subjected to the cooling for three hours at the temperture of the water in city mains, were made or one each shift.

Three anaylses of the blue water gas were made, or one each shift.

Three analyses of the finished carburetted water-gas or "make" gas were made, or one each shift.

Twelve determinations (by the Tutwiler apparatus) of the hydrogen sulphide (H_2S) in the crude carburetted water-gas at the inlet to the purifiers were made, or one each two hours.

Six determinations (by the Tutwiler apparatus) of the hydrogen sulphide (H_2S) in the crude blue water-gas at the inlet to the carburetter were made, or one every four hours.

One determination (by the referee's apparatus) of the total sulphur in the finished carburetted water gas was made upon an average daily sample.

One determination of the naphthalene content of the finished gas was made upon an average daily sample.

Twenty-four readings each of the temperatures of the condenser outlet, inlet to purifiers, outlet from purifiers and outlet of station meter were made, or one set each hour.

Nine readings of the temperatures of the city water used for cooling the "make" gas were made or one each hour for each three hour cooling period for each shift.

One continuous daily record chart of temperature for each carburettor and each superheater of each gas machine operated.

Twenty-four readings of station meters statements were made or one each hour.

Twenty-four readings of oil meter statements for each gas machine operated were made or one each hour.

One reading of the gauge on gas oil storage tank was made.

In addition to the foregoing, all generator fuel was weighed so that the amount charged daily was known; the generator fuel was sampled daily so that an average composition could be determined, and the ash removed from the generators also was weighed so that a daily total could be recorded.

Other observations in connection with tests upon matters of minor interest, were also made.

During the period from 7 a. m. September 19, 1919, to 7 a. m. September 30, 1919, an eleven-day test was run upon the Mid-Continent mixed gas oil in gas machines Nos. 4 and 5.

On the 30th of September a change was made to Mexican gas oil.

From 7 a. m. October 1, 1919, until 7 a. m. October 6, 1919, a second series of tests, covering a five-day period, were made upon the Mexican gas oil in the same gas machines, namely Nos. 4 and 5, under as near comparable conditions as possible to those existing during the eleven-day test period previously mentioned.

On October 6, two additional gas machines were started with the object of running the gas works at full load with the Mexican gas oil in order to note the general effects, if any, produced by this condition.

On October 7th and 8th special tests were run upon the rate of absorption of the hydrogen sulphide contents of the gas by the various purifiers, and on the latter day in particular, a series of comparative tests were run in which the works were run alternately with Mid-Continent mixed oil and Mexican gas oil and tests made by a Tutwiler apparatus to determine the graine of sulphuretted hydrogen (H_2S) per 100 cubic feet of gas at the inlet to the purifiers and at the outlet of each purifier when the gases were being passed through the purifiers at approximately the same rate.

In addition to the tests at the works a number of comparative "cracking" tests upon the Mid-Continent mixed gas oil and the relative tendencies of the oil to form oil gas, tar carbon, hydrogen sulphide, total sulphur, etc., and the relative contributions to the total heating values of the finished gases.

Results of Tests

The results of the various tests made are shown in the following tabulations:

TABLE OF COMPARATIVE OPERATING RESULTS OBTAINED

	Mid-Continent	Mexican
Kind of oil used		
Period of test	Sept. 19 to 29, 1919, inclusive	Oct. 1 to 5, 1919, inclusive
Number of days of test	11	5
Gas Produced, total corr. M. cu ft.	21023	10299
Gas produced average daily corr. M. cu. ft.	1911	2060
Oil used, total gals. by tank	69890	34089
Oil used, total gals. by meters	70120	33760
Oil used, av. gals. per M. cu. ft. by tank	3.32	3.31
Oil used, av. gals. per M. cu. ft by meters	3.34	3.28
Coke used, average lbs. per M. cu. ft.	39.30	35.33
Ash produced, total lbs.	53,605	23,640
Ash produced, average daily lbs.	4,873	4,728
Ash produced in per cent of coke used	6.49	6.50
Calculated B. T. U's contributed per gal. of gas oil to total heating value of gas.	97,100	104,500
Calculated cu. ft. of oil gas made per gal. of oil used	52.2	59.4
Temperature of brick, average in carburetor in °F	1350	1357
Temperature of brick, average in superheater in °F	1320	1321
Temperature of brick, average in gas machine in °F	1335	1339
Temperature of gas at condenser outlet, °F	152	147
Temperature of gas at purifiers inlet, °F	111	107
Temperature of gas at purifiers outlet, °F	96	91
Temp. of gas at station meter outlet, °F	89	84
Temp. of outside atmosphere in °F	72	72

Average Analysis	Blue Water Gas	Make Gas	Blue Water Gas	Make Gas
Carbon dioxide	2.87	4.76	3.30	5.02
Illuminants	.01	8.41	.00	9.08
Carbon Monoxide	42.80	33.49	41.77	32.15
Oxygen	1.28	1.12	1.30	1.21
Hydrogen	46.15	32.56	45.46	31.13
Methane	2.20	10.75	1.45	11.74
Nitrogen	4.69	8.91	6.72	9.67
Grains of H_2S per 100 cu. ft. of Blue Water Gas	70		76	
Grains of H_2S per 100 cu. ft. of crude carburetted water gas	106		154	
Grains of total sulphur per 100 cu. ft of finished carburetted water gas	8.9		13.3	
Total heating value of Make Gas at meter outlet in Btu. per cu. ft.	580		588	
Loss in heating value of Make Gas by cooling for 3 hours with city water	9		9	
Temp. of cooling water average in °F	67		65	
Number of degrees of cooling	16		17	

TABULATION OF COMPARTIVE TEST RESULTS ON PURIFIER SYSTEM

	Kind of Oil Mid-Continent			Kind of Oil Mexican			Kind of Oil Mexican		
	Rate of flow through Purifiers in cu. ft. per hr.								
	121,500			124,000			159,700		
	H_2S per 100 cu. ft. of gas			H_2S per 100 cu. ft. of gas			H_2S per 100 cu. ft. of gas		
	Contained in grains	Removed grains	%	Contained in grains	Removed grains	%	Contained in grains	Removed grains	%
Crude	91	..	..	135	..	..	172	..	..
Box No. 1		81	89		123	91		153	89
Outlet Box No. 1	10			12			19		
Box No. 2		2	2.2		4	3.		15	8.7
Outlet Box No. 2	8			8			4		
Box No. 3		8	8.8		8	8.		4	2.3
Outlet Box No. 3	0			0			0		
Box No. 4		0			0			0	
Outlet Box No. 4	0			0			0		

Throughout the tests a uniform schedule of machine operation was maintained of 2 up runs and 1 down run—each of 4 minutes duration and a 3 minute blow. Live steam was used, the quantity being controlled by maintaining a constant pressure on an orifice in the line, 60 pounds per square inch on the up run and 70 pounds per square inch on the down run. The machines were cleaned twice each 24 hours.

Discussion of Results

The accompanying tabulations show that a very favorable uniformity of conditions prevailed throughout the tests, thus making the results for the Mid-Continent Mixed gas oil and the Mexican gas oil fairly comparable.

The operating results, which were obtained during test periods wherein the equipment was operated to give the best possible results under the existing conditions, show that among other things, the Mexican gas oil contributed about 7,400 B. t. u. more to the total heating value of the gas per gallon of oil used than did the Mid-Continent Mixed gas oil. This calculated contribution based upon actual operating data was also indicated by the cracking results obtained by laboratory tests which showed an increase with the Mexican gas oil of about 8,200 B. t. u. to the total heating value of the gas.

Another feature which was noted was the apparent tendency of the Mexican gas oil to produce a greater volume of oil gas than the Mid-Continent oil. As estimates, calculated from the actual operating results, the Mexican gas oil yielded about 59 cu. ft. of oil gas per gallon of oil used whereas, the Mid-Continent mixture gave about 52 cu. ft. This tendency to yield an increase of oil gas with the Mexican oil was also noted in the laboratory investigations. It is believed that this increase accounts at least partly for the decrease in amount of coke required from an average of 39.30 with the Mid-Continent mixture to 35.33 lbs. per M. cu. ft. of gas made with the Mexican gas oil.

One of the outstanding features noted contained on the average about 154 grains of hydrogen sulphide (H_2S) per 100 cu. ft. This content compared to the 106 grain average obtained in the gas made with Mid-Continent gas oil was approximately 50 per cent increase in the amount of sulphur to be removed by the purifying system.

The results shown in the "Tabulation of Comparative Test Results obtained on the Purifier System October 8, 1919" indicate that the increase of 50 per cent in hydrogen sulphide content of the crude gas results in a proportional increase in the rate of absorption by the purifying increase would make itself apparent solely as a 50 per cent increase in the rate at which purifying boxes would become foul and require dumping and refilling, conditions being fairly comparable to those which existed at the Station. In other words, provided the gas was reasonably free from tarry matters the indications are that an average purifying material would increase its rate of H_2S absorption approximately in proportion to the increase in the H_2S content of the crude gas which means that the Mexican gas oil as compared to the Mid-Continent Mixture would result in 50 per cent increase in the number of purifiers dumped and amount of purifying material used in a given time.

The test results show that the relatively high sulphur oil namely, the Mexican gas oil gave an average of about 13 grains of total sulphur per 100 cu. ft. of finished carburetted water gas.

So far as could be told by observation during the tests made at the Station, there was little difference between the two gas oils as to their tendencies to deposit carbon in the checkerbrick. there being con-

paratively little carbon deposited in either case during the periods of the tests. This conclusion was verified by the Laboratory investigations which also indicated that the tar produced was practically the same in both cases.

Works experience with Mexican oil showed that no marked tendency of the oil to emulsify or froth existed under the conditions of the test.

The results of the cooling tests which showed that the gases made from each of the oils under investigation lost 9 B. t. u. in total heat value with the same degree of cooling, indicate that the gases made from these oils have about the same B. t. u. stability.

The results obtained show that the compositions of the cokes used during the two test periods were quite similar and fairly typical of general average generator fuel used by the company.

The actual experience in handling the Mexican gas oil together with the data as to the cold test and specific viscosity indicate that at temperatures around 60° F the oil is practically as readily pumped and handled as the Mid-Continent Mixed gas oil. However, in winter time or cold weather we believe that the Mexican oil would have to be transported in tank cars equipped with steam coils as it practically ceases to flow at obtu 21° F.

Conclusions

As a result of a consideration of the test data we have come to the following conclusions concerning the use of Mexican gas oil for the manufacture of carburetted water-gas in the City of Chicago.

1. The Mexican gas oil can be readily handled at temperatures about 60° F but would have to no doubt be shipped in steam coil tank cars in cold weather as the oil practically ceases to flow at 21° F.

11. The Mexican gas oil contributes about 8000 more B. t. u. per gallon of oil used to the total heating value of the gas made than does the Mid-Continent gas oil.

III. The Mexican gas oil gives relatively little carbon deposits as compared to other gas oils.

IV. The Mexican gas oil gives no noticeable difference as compared to the Mid-Continent gas oil with regard to the yield of tar per gallon of oil used.

V. The Mexican gas oil while comparatively high in its content of sulphur, yields only a 50 per cent increase in the H_2S content of the crude gas as compared with the content in gas made from the Mid-Contitnent mixture which in this respect is believed to be fairly typical of the general average gas oils as used in conjunction with general average generator fuel by the company.

VI. The Mexican gas oil does not contribute an excessive amount of total sulphur to the finished carburetted water-gas.

VII. The Mexican gas oil apparently yields noticeably more oil gas per gallon of oil used than does the Mid-Continent Mixed gas oil although somewhat lower than those by the better oils used by the company.

VIII. The Mexican gas oil appears to yield as stable gas as the Mid-Continent Mixed oil.

It must be admitted however, that the Mid-Continent mixed gas oil used in these tests was not the best grade of gas oil obtainable.

Recommendations

In the light of the comparative physical and chemical values of Mexican gas oil, forming the basis of this report, it is recommended that a separate study and report be made of the monetary value of the oil, particularly, as it is affected by the problem of purification.

Chicago, Ill.—Standard Oil Company (Indiana) has just awarded a contract to the Green Engineering Corporation for supplying a large number of stokers for the oil company's Whiting, Indiana, refinery.

AVERAGE ANALYSES OF COKE USED

	11 Days With Mid-Continent	5 Days With Mexican Oil
Moisture	3.51	4.90
Volatile matter	5.12	5.64
Fixed carbon	82.95	81.23
Ash	8.42	2.23
Sulphur	1.16	1.07

TABLE OF COMPARATIVE RESULTS OBTAINED BY CRACKING TESTS AT THE LABORATORY

	Kind of Oil Used	
	Mid-Continent	Mexican
Average temperature of cracking °F	1395	1360
Gals. of oil used per M cu. ft of gas made	3.34	3.36
Cubic feet of oil gas produced per gal. of oil used per M. cu. ft. of gas made	50.1	52.2
Percent by weight of oil forming gas	55.8	57.3
Percent by weight of oil forming tar	28.9	27.5
Percent by weight of oil forming carbon.	15.3	15.2
B. T. U. contributed per gallon of oil to total heating value of gas made	91000	99200
Analysis of Finished Gas:		
Carbon dioxide	4.0	3.8
Illuminants	8.0	7.8
Oxygen	0.4	1.0
Carbon monoxide	33.4	30.6
Hydrogen	33.1	30.9
Methane	16.2	18.7
Nitrogen	4.9	7.2
Total B. T. U. per cu. ft. of gas	565	588
Specific gravity of gas	.634	.640
Hydrogen sulphide in grains per 100 cubic feet of finished gas basis of 100 grains of H_2S in the blue gas portion	103	158

The following analyses and test results were obtained upon the two oils subjected to comparative tests:

Kind of Test, etc.	Mid-Continent Mixed Gas Oil	Mexican Gas Oil
General Description	Deep brown opaque oil with dark fluoresence	Deep brown Translucent oil with dark green fluoresence.
Baume degrees of original oil at 60°	27.1	26.9
Specific Gravity of original oil at 60° F	.8912	.8923
Fractional Distillation Initial distilling Point °F	213	292
213° F to 300° F Fraction % by weight	.70	...
292° F to 300° F Fraction % by weight	...	.10
300° F to 400° F Fraction % by weight	.10	2.45
400° F to 500° F Fraction % by weight	25.70	12.80
500° F to 600° F Fraction % by weight	36.05	30.60
600° F to 682° F Fraction % by weight	34.55	....
600° F to 700° F Fraction % by weight	....	36.80
700° F to 748° F Fraction % by weight	....	16.65
Residue	1.00(coke)	.50(coke)
Loss	1.90	.10

Gravity of Fraction at 60° F in °Be		Sp. Gr.	°Be	Sp. Gr.
300° F to 400° F Fraction	...	.....	47.0	.7910
400° F to 500° F Fraction	33.9	.8545	37.3	.8368
500° F to 600° F Fraction	22.4	.8783	30.4	.8728
600° F to 682° F Fraction	25.9	.8980	....	.....
600° F to 700° F Fraction	...	.....	24.7	.9050
700° F to 748° F Fraction	...	.....	19.0	.9396
Total Sulphur in Original Oil (by Mahler bomb)	.24		1.65	
Flash Point, by Elliott Open tester in °F	193		151	
Burning Point by Elliott open tester in °F	218		194	
"Cold Test Point" (°F at which oil will not flow)	less than 21 above 0		21	
Specific Viscosity at 60° F (Relative to water as 1)	1.69		2.39	

Methods for Determining Sediment in Oils

Bureau of Mines makes report on the various systems used after investigation

By A. D. Bauer
Assistant Petroleum Chemist

In the commercial examination of crude petroleum, one of the most commonly used tests is the centrifuge test for "B. S. and water", the term "B. S." signifying actual sediment, emulsified oil, or both. In this test a measured sample of the oil is mixed with a suitable solvent in graduated centrifuge tubes and whirled in a centrifugal machine until a distinct line of separation appears between the solution and the combined water and sediment.

This method was adopted by the Committee on the Standardization of Petroleum Specifications* for determining sediment in fuel oils. The Bureau of Mines, in its work of inspecting fuel oils for the various Federal Departments found that this method was not readily applicable to heavy oils, as no sharp separation could be secured. At the recommendation of the Bureau, the Interdepartmental Petroleum Specifications Committee** adopted a benzol extraction method for sediment in heavy oils and the centrifuge method, as modified and standardized by the American Society for Testing Materials, for light oils.

The present investigation was undertaken to aid the Interdepartmental Committee in determining satisfactory limits for the different methods for determining sediment. Twenty-two samples of fuel oil were selected, varying in Saybolt Furol viscosity at 122° F. from 19 seconds to 384 seconds. The percentage of sediment in each sample was determined by the benzol extraction and the A. S. T. M. centrifuge methods (No. 300.2 and No. 300.3 respectively, Technical Paper 298, Bureau of Mines). The sediment in a few of the samples was also determined by a Bureau of Mines procedure developed by Messrs. Dean and Lerch.*** The percentage of water and viscosity of each sample were determined by methods No. 300.1.

Benzol Extraction Method (No. 300.2)

Ten grams of the sample to be tested are placed in a porous alundum thimble and the oil extracted with 90 per cent benzol. The extraction is continued with fresh benzol until the weight of the dried thimble and sediment is constant. The results are reported in terms of percentage by weight of sediment.

By Centrifuge (No. 300.3)

Fifty c. c. of 90 per cent benzol are placed in two graduated centrifuge tubes and 50 c. c. of the sample of oil are then added to each tube. The tubes are shaken thoroughly and heated in a water bath to a temperature of 100° F. for 10 minutes, and then whirled for 10 minutes at about 1450 r. p. m. in a centrifuge. The whirling is repeated for ten-minute periods until the volume of water and sediment in the bottom of each tube remains constant for three consecutive readings. The sum of the readings of the two tubes is recorded as the percentage of water and sediment, centrifuge method.

Sample No.	% Sediment Method 300.2	% Sediment Method Dean-Lerch	% Sediment and Water Method 300.3	Saybolt Furol Viscosity at 122°F. Method 30.2	Per cent Water Method 300.1	Sp. Gr. at 60°F.
2842	.015		Too heavy	384	0.1	.960
	.021					
2840	.014	.010	" "	375	0.7	.963
	.013	.011				
2841	.021	.017	" "	329	0.2	.966
	.021	.015				
2837	.014	.016	" "	303	0.2	.964
	.013	.013				
2850	.011		" "	298	0.3	.963
	.010					
2848	.023		" "	264	0.4	.962
	.018					
2847	.010		" "	233	0.7	.961
	.011					
2843	.012		1.1	224	0.6	.962
	.011					
2849	.019		Too heavy	217	0.4	.961
	.011					
2884	.009		" "	215	0.2	
	.009					
2859	.047		3.1	178	4.2	
	.048					
2903	.011		0.2	167	Nil	
	.015					
2923	.017		0.5	162	Trace	
	.022					
2883	.013		0.4	146	0.2	
	.012					
2927	.126		No line of separation	145	..	
	.119		Black sediment			
2906	.014		0.25	143	Nil	.957
	.015					
2905	.018		0.2	136	Nil	.960
	.012					
2926	.166		No line of separation	131	0.1	
	.163		Black sediment			
2924	.102		No line of separation	82	0.1	
	.111					
2925	.211		..	78	0.2	
	.218					
2802	.017	.011	0.8	19	0.4	.921
	.019	.007				
2922	.112				0.2	
	.124		..			

Method of Dean and Lerch

An alundum crucible is ignited, cooled, weighed and adjusted in a Spencer holder, the rubber ring being slipped over the top and the line of contact being as nearly as possible at the upper edge of the crucible. The crucible and ring are pushed into a Spencer funnel until the bottom of the crucible rests on the three projectig points. The funnel is then inserted in the neck of the suction flask. Ten grams of the oil to be tested are weighed in a beaker, 50 c. c. of 90 per cent benzol are added, and the mixture is heated to a temperature of 140° to 158° F. The oil-benzol mixture is filtered throug the alundum crucible, care being taken that the latter is never more than two-thirds full at any time. The beaker is washed out with additional benzol to make sure that all sediment will be transferred to the crucible. The crucible is washed with benzol until all oil is removed, which is usually indicated by the passage of colorless wash liquid. The crucible is detached from the holder and the rubber ring dried for at least one hour at a temperature of approximately 100° C., cooled and weighed. The results are reported as percentage of sediment by weight.

Results of Determinations

The results of the determinations are given in Table 1. These results indicate that the benzol extraction method (330.2) can be used satisfactorily for all grades of fuel oils. By having a battery of extraction apparatuses the operator can save time both in the set-up and while the extraction is taking place. The determination needs litt'e or no attention during the extraction, and with reasonable care in weighing, close checks on duplicate determinations may be secured. Care must be taken that the heat is not applied too strongly to the extraction flask, in which case the benzol will overflow the thimble rather than filter through. This would cause an error in the determination.

The A. S. T. M. Centrifuge method (300.3) is satisfactory for light oils, having a Saybolt Furol viscosity of 200 seconds or less, such as bunker fuel oil "B." The sediment failed to separate from the heavy oils such as bunker fuel oils "C," so that a reading could not be made. In some of the determinations a heavy black sludge remained in the tip of the centrifuge tube after the oil-benzol

*Bulletin No. 5, Report of Committee on Standardization of Petroleum Specifications, December 29, 1920.

**Bureau of Mines Technical Paper 298, Methods for Testing Petroleum Products and Technical Paper 305, Specifications for Petroleum Products.

***Manuscript unpublished.

Comparison of Paraffin and Asphalt Lubes

Various properties of lubes coming from each source are taken under discussion

By F. N. Williams

Much has been written about the relative merits of lubricating oils manufactured from asphalt and paraffin base crudes, and the writer will here attempt to place in regular order a direct comparison of the various properties of lubricating oils from each source. Starting with two oils of equal viscosity at 100 degrees F. Saybolt Universal, and charting the effect of heat on each oil.

Physical and Chemical Properties

	So-called "Asphalt"	Paraffin
Gravity Baume	20.6	22.4
Spec. grav. @ 60 F....	.9296	.9186
Pounds per gallon	7.742	7.650
Flash, open cup	360 F.	420 F.
Fire, open cup	430 F.	490 F.
Color, Lovibond	188	292
Cold Test	20 F.	40 F.
Viscosity, Saybolt Univ.		
@ 70 F.	1788	981
@ 100 F.	361	361
@ 140 F.	121	132
@ 212 F.	49	52
Evaporation, 5 hours		
@ 150 F.	.039%	.0026%
@ 300 F.	.786%	.182%
Index of Refraction	1.510	1.509
Sulphur content	.201%	.551%
Ash, (50 grams.)	.007%	.0016%
Conradson Carbon Test .	.063%	.130%
Tar content by H_2SO_4...	9.0%	11.0%
Emulsification	O. K.	O. K.

mixture was poured off. As this sludge had the same color as the oil itself, it was impossible to make a reading without pouring off the benzol solution. In the case of sample No. 2925 this black sludge amounted to about 10 per cent; sample No. 2926 showed about 6 per cent, and sample No. 2927 showed about 4 per cent. If the operator was looking only for a line of separation between the oil and sediment, this sludge would not be recorded. Probably if the top liquid was decanted from the tube, more benzol added, and the contents shaken thoroughly and again whirled in the centrifuge, a separation would be effected. This was not done in the present investigation, as it was desired only to determine what results could be obtained by adhering strictly to the specified method.

The Dean and Lerch method for the determination of sediment is not entirely satisfactory, but gives results comparable with the other benzol methods and may be found useful in some laboratories. The process is somewhat tedious, and unless great care is taken the rubber ring around the top of the porous crucible may leave a deposit on the crucible. The oil which is being filtered creeps up the walls of the crucible and it is very difficult to wash out all the oil stain.

It must be remembered in comparing methods 300.2 and 300.3 that one is gravimetric and the other volumetric. When the specifications are based upon the benzol extraction method, the percentage of sediment specified should be small, but when based upon the centrifuge method, since the volume is being measured, the allowable percentage of sediment should be larger.—Reports of investigations, U. S. Bureau of Mines.

It will be noticed upon examination of the various properties of the two oils, that some extreme differences exist in the viscosities, the asphalt-base oil losing 1427 seconds while the paraffin base loses only 620 seconds.

It is on this account that we hear so much about the supposed superiority of the paraffin base oil, the above difference in the loss of viscosity would be immediately pointed out by the adherents of paraffin base oils.

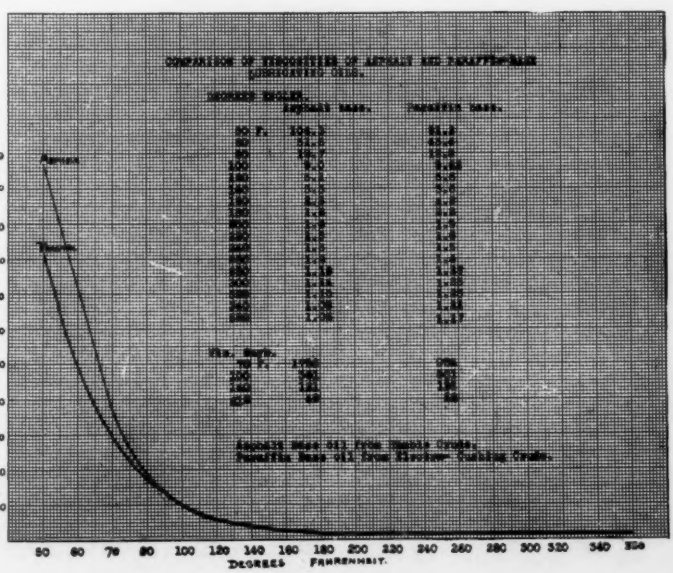
Possibly on the face of it there is some room for argument, but very little of this oil would be used at temperatures between 70 and 100 degrees Fahr., so we might twist the argument about lost viscosity around and make a statement, that down to its solidifying point paraffin base oil does not increase in viscosity as rapidly upon cooling as does asphalt base oil; not that this argument is of any more importance than the 70 to 100 one.

From 100 to 212 degrees Fahr. the paraffin base oil lost 309 points in viscosity and the asphalt base 312 points, which indicates that very little difference exists in the two oils at temperatures somewhere near working conditions.

At temperatures above 212 it will be seen that the oils are identical as to viscosity.

The carbon content is often considered of importance, here agin the asphalt base scores as the percentage of carbon in this oil is not only lower than that of the paraffin base but of a different nature. In this particular test, as well as in many others, it was noticed that the carbon from the paraffin base was hard and gritty while that from the asphalt base was soft and flaky and in such condition as would render it easy to remove from a cylinder and furthermore on account of this flaky condition, the danger of scored cylinder walls was practically nil.

This is not intended as an attack on the lubricating qualities of paraffin base lube oils which are well known, but an effort to bring out the really good qualities of the asphalt base oils, and particularly the oils made from Coastal crudes. And it gets really tiresome to listen to the claims of many oil dealers, that their oils are made from straight run Pennsylvania crude, in fact, if as much lube oil is made from Pennsylvania crude as is claimed the production of Pennsylvania crude is undoubtedly leading, if not only all the other states, individually, but possibly the rest of the states combined.



Preferred Dividends to Be Resumed by Paragon

Toledo, Ohio.—Payment of dividends on the preferred stock, which have accumulated for five quarters, likely will be resumed by the Paragon Refining Company after the first of the year. Stockholders annual meeting is scheduled to take place in December when it will be shown that the company is earning at a very satisfactory rate and that operating profits for the fiscal year ended October 31, 1922, will be large.

The Paragon disposed of 6,000,000 gallons of fuel oil during September as compared to 800,000 in corresponding month of last year and new acreage has recently been acquired in Kentucky and Texas fields.

Engineer Says Gasoline Price Too Low

Arthur Knapp analyzes question and sees both buyers' and sellers' sides

The statement that the price of any commodity is high or low implies that a comparison has been made with some other price or value. Before this statement regarding price can be understood by others it is necessary to know what the standard of comparison is.

There are two sides to the question of price, the buyer's side and the seller's side. Both sides must be considered in the final analysis of price. Some standards of comparison effect only the buyer's view, while some effect only the seller's view. There are other standards which effect both.

The buyer may judge prices on the basis of:

By Arthur Knapp *

(A) Price ask vs. economic value to be received.

This effects the buyer's view but does not effect the seller. On the other hand there are standards which effect only the seller, viz.:

(B) Price ask vs. price of raw material.

(C) Price ask vs. manufacturing and labor costs.

Both buyer and seller may consider the following in analyzing costs:

(D) Price ask vs. previous price of same article or price ask by others for the same article.

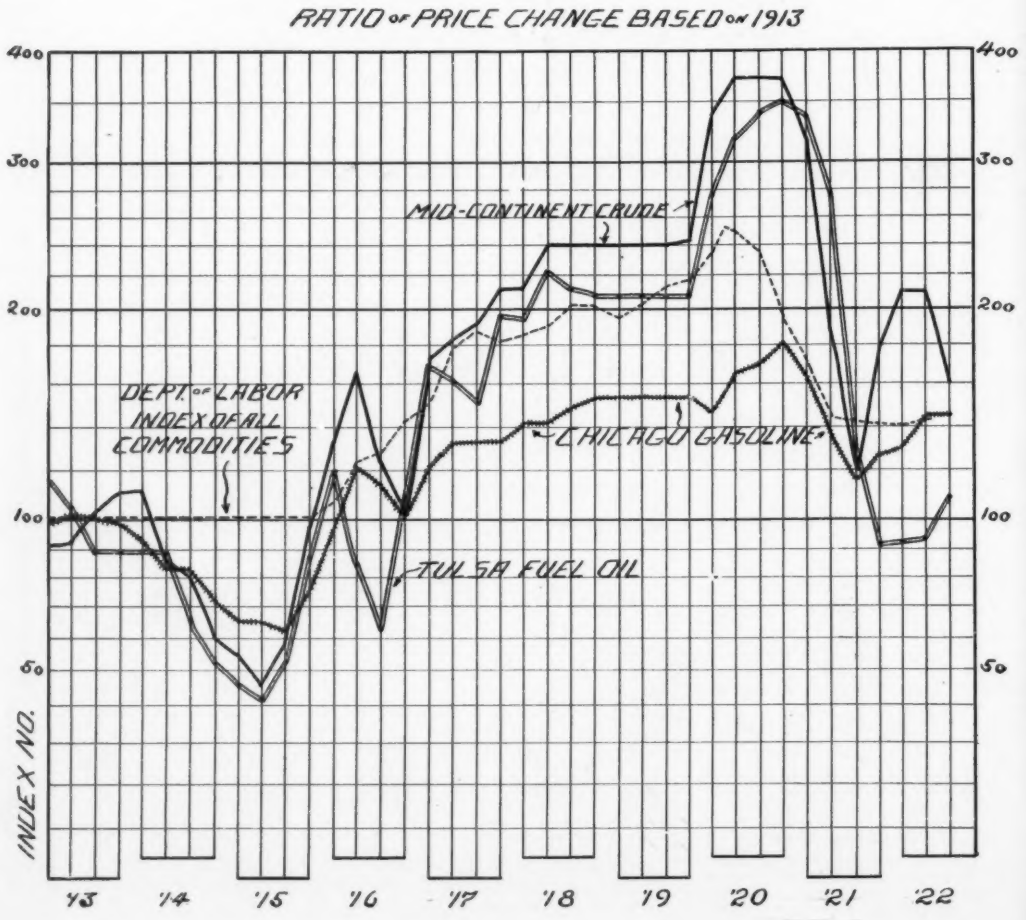
(E) Price ask vs. average price of a number of other commodities.

One or all of the above comparisons may be used depending upon circumstances. All of them must be considered in a final analysis.

First consider the price of gasoline vs. the economic value. In general the gasoline sold throughout the country is very uniform in grade. The reports of the Bureau of Mines shows it to be much more uniform than in years past. The efficiency with which gasoline is used in modern motor vehicles is increasing regularly. The economic value of gasoline as an aid to the general growth of industry is also increasing from year to year.

The price of gasoline has increased 50 per cent since 1913. The economic value, even if only the three points mentioned above are considered, has certainly increased 50 per cent.

Second, consider the price from the re-



*Petroleum Engineer, Box 1902, Philadelphia.

Mr. Refiner—

Shoot a Dollar!

The REFINER AND NATURAL GASOLINE MANUFACTURER is the only publication devoted exclusively to the interests of the people engaged in the operating branch of the refining and natural gasoline business. It is YOUR publication, Mr. Refiner, and we want you to become a regular reader, so tear off the coupon and shoot it in with a dollar bill, check for a dollar, or the equivalent in liberty bonds, war saving stamps, rubles, pesos, francs or piasters—anything but oil stocks.

DO IT NOW!

The REFINER and NATURAL GASOLINE MANUFACTURER,
Box 1307, Houston, Texas.

Gentlemen: Please find enclosed one dollar (check or currency will do) for which send me your publication for one year.

Name.....

Street and No.....

City.....

State.....

Executive—Superintendent.
Please check above.

Photo by Clarence Jack, Tulsa
Natural gasoline plant of the Charles F. Noble Oil and Gas Company in the Burkburnett field, the largest plant in Texas.

North Texas Has 89 Natural Gasoline Plants

Methods used divided about equally between absorption and compression

WICHITA FALLS, TEXAS.—The natural gasoline manufacturing industry within the North and Central West Texas districts has experienced an extraordinary growth during the past two years, and is expanding as new gas producing areas are uncovered. These two districts have a total of 89 plants of which 46 are equipped to use the absorption process, while the remaining 43 have installed the compression method of extracting the gasoline from the gas. The potential handling capacity of all of these plants amounts to approximately 374,707,000 cubic feet of gas daily, but is not being fully utilized owing to declines of gas production from the older wells. Some of the gas producing areas, especially in Wichita and Eastland Counties, are greatly overpopulated with plants due to construction being done when a large flush production of gas prevailed.

Wichita County is credited with having 31 compression and two absorption plants with a combined handling capacity of 35,927,000 cubic feet of gas. Although this county has a greater number of plants than any other county within the state, it ranks third in handling capacity, as Stephens County has a total capacity of 147,000,000 cubic feet daily, and Eastland County approximately 80,400,000 cubic feet. One particular feature about the Wichita County plants is that a record yield of gasoline is obtained from the gas, which is reported to be becoming richer in gasoline content as the gas production decreases. The greatest yield per thousand cubic feet in Wichita County amounts to 11 gallons, which is done by the Sinclair Oil and Gas Company's compression plant in the Burkburnett field. The average recovery per thousand cubic feet throughout the county ranges from three to six gallons.

The absorption process is used altogether in the Stephens County district, which has 21 plants. Gas produced in this county affords a comparatively small yield and ranges from one-quarter to one and one-half gallons per thousand. In Eastland County, which includes Ranger, Eastland and Pioneer districts, there are 18 absorption plants and 10 other plants using the compression method of gasoline extraction. Gas produced in the Desdemona district affords a recovery of from two to four gallons per thousand, while the other two districts furnish from a fraction of a gallon to three gallons per thousand.

The Lone Star Gas Company, which supplies commercial gas for about 45 cities in North and Central West Texas from fields in Texas and Oklahoma, is stripping the gasoline content of a portion of this gas through huge absorption plants located at advantageous places on its trunk lines. Although the recovery is small the huge volume of gas handled makes it profitable, and does not materially reduce the heating qualities of the product sold to the public. This company erected a 40,000,000 cubic foot capacity plant at Gainesville early this year, and is completing a 15,000,000 cubic foot plant near Brazos in Palo Pinto County that can be increased to 40,000,000 cubic feet later on.

The table shows the number of plants in the North and Central West Texas district by counties:

Counties—	Absorption Process	Compression Process	Total Plants	Cubic Foot Daily Cap.
Stephens County	21	..	21	147,000,000
Eastland County	18	10	28	80,400,000
Wichita County	2	31	31	35,927,000
Young County	2	1	3	6,000,000
Clay County	1	..	1	50,380,000
Cooke County	1	..	1	40,000,000
Palo Pinto County	1	..	1	15,000,000
Totals	46	43	89	374,707,000

A list of gasoline plants will be foundon pages 18 and 19.

finer's standpoint. While the price of gasoline has increased 50 per cent over 1913, the price of crude has also increased. Today the average crude price is also 50 per cent higher than in 1913, but the price of crude has ranged from 100 to 250 per cent above the 1913 price during the past 6 years. Gasoline has never been 100 per cent above 1913 and has averaged only 50 per cent above for the past 6 years.

Manufacturing and labor costs have increased more rapidly than the price of gasoline. Labor has increased from 100 to 200 per cent, steel 50 per cent, cement 50 per cent, construction costs from 50 to 100 per cent, refining supplies over 50 per cent.

Therefore, from the refiner's standpoint, the price of gasoline is low at present and has been relatively lower during most of the past six years.

Third, consider gasoline prices against prices of other commodities. The Department of Labor's Index of all commodities, based on 1913 averages, is 150 for the third quarter of this year. The gasoline index is also 150. At no time since 1913 has the gasoline index been equal to the index of all commodities. During the period 1918-1920 the gasoline index remained close to 150, while the index of all commodities averaged over 200. Today the price of gasoline is normal with respect to general price averages but this is for the first time since the last quarter of 1916.

The conclusion is that the price of gasoline is too low today.

There would be no profit in trying to calculate what the price should be. The price would be right for all concerned if the law of supply and demand were allowed to operate without the interference of Congressional investigations, unjust freight rates, senseless competition and foolish regulations.

Gulf Again Wins Right to Aluminum Chloride Patent

Houston, Texas.—The decision handed down by the Supreme court of District of Columbia involving patent litigation between George William Gray and The Texas Company and Dr. A. M. McAfee and the Gulf Refining Company, was upheld by Judge W. Lee Estes sitting in the United States District court for east Texas on October 11. The case will probably now be taken to the United States Circuit Court of Appeals at New Orleans.

Judge Estes affirmed the decision of the District of Columbia court which declared that the Gulf Refining Company and Dr. McAfee were entitled to patent rights covering the aluminum chloride gasoline process invented by Dr. McAfee.

The controversy has lasted for about ten years.

California Refinery Fire Results in Heavy Loss

The fire which destroyed $75,000 worth of tankage and refined products at the Los Angeles refinery of the Richfield Oil Company on October 9. Escaped lubricating oil makes a mirrored surface in the foreground.

Early reports that the fire may have been due to the careless handling of casing-head condensate lack substantiation. The plant is located in the industrial district, where a spark from nearby trains could easily have started the blaze.

Foamite firefoam was rushed to the scene from nearby refineries, as the Richfield plant was not equipped with this protection, and the main body of the refinery was saved, the fire being confined to small storage tanks. The loss was covered by insurance.

This company has been involved in two fire losses recently, one of its trucks having figured in the Downey disaster, where a filling station was destroyed by fire, and several lives were lost.

North and Central West Texas Natural Gasoline Plants

Company and Sales Office Address—	Farm and Survey Plant Location	Units	Process	Cu. Ft. Capacity
STEPHENS COUNTY—				
Bradley Company, Breckenridge, Texas	J. R. Cody, NE¼ Section 3, Lunatic Asylum Lands	1	Absorption	1,000,000
Breckenridge Gasoline Company, Breckenridge, Texas	L. A. Stoker, SW¼ Section 10, Lunatic Asylum Lands	6	Absorption	3,000,000
Brooks & Hanlon Inc., 7th & Cheyenne Sts., Tulsa, Okla.	B. S. Walker, E½ SE¼ Section 3, Lunatic Asylum Lands	6	Absorption	24,000,000
Central Gasoline Company, Breckenridge, Texas	W. P. Newell, Section 1025, T. E. & L. Co. Survey	3	Absorption	16,000,000
B. C. DeWitt & Co., F. & M. Bank Bldg., Fort Worth, Texas	SW½ Section 9, Lunatic Asylum Lands	1	Absorption	†1,000,000
Hipower Gasoline Co., F. & M. Bank Bldg., Fort Worth, Texas	B. S. Walker, W part N½ Section 22, Lunatic Asylum Lands	4	Absorption	8,000,000
Hipower Gasoline Co., F. & M. Bank Bldg., Fort Worth, Texas	J. M. Martin, W½ NE¼ Section 4, Lunatic Asylum Lands	2	Absorption	4,000,000
Hydro Carbon Products Co., F. & M. Bank Bldg., Fort Worth, Texas	J. C. Hale, E½ SE¼ Section 14, Lunatic Asylum Lands	4	Absorption	2,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	C. B. Brown, SE¼ Section 13, Lunatic Asylum Lands	4	Absorption	4,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	A. M. Sullivan, Section 2066, T. E. & L. Co. Survey	2	Absorption	2,000,000
National Products Co., F. & M. Bank Bldg., Fort Worth, Texas	B. S. Walker, S¼ NW¼ Section 3, Lunatic Asylum Lands	3	Absorption	1,500,000
National Products Co., F. & M. Bank Bldg., Fort Worth, Texas	M. C. Chaney, SE¼ NW¼ Section 2, Lunatic Asylum Lands	4	Absorption	2,000,000
National Products Co., F. & M. Bank Bldg., Fort Worth, Texas	E. C. Ward, N¼ SE¼ Section 10, Lunatic Asylum Lands	3	Absorption	1,500,000
Plateau Gas Products Co., F. & M. Bank Bldg., Fort Worth, Texas	E. C. Ward, S¼ SE¼ Section 10, Lunatic Asylum Lands	1	Absorption	3,000,000
Roeser & Pendleton Gasoline Co., P. O. Box 1618, Breckenridge, Texas	J. V. Gardner, S½ SW¼ Section 17, T. P. Ry. Survey, Blk. 8	6	Absorption	9,000,000
Snowden & McSweeney Interests, Breckenridge, Texas	J. C. Higginbotham, NE¼ Section 1, Lunatic Asylum Lands	3	Absorption	5,000,000
Shield Petroleum Co., Breckenridge, Texas	B. H. Epperson Survey	5	Absorption	15,000,000
Smith & Whitney, Southwestern Life Bldg., Dallas, Texas	Eugene Milam, Section 1024, T. E. & L. Co. Survey	2	Absorption	2,000,000
Texas Pacific Coal & Oil Co., F. & M. Bank Bldg., Fort Worth, Texas	A. S. Veale, Section 1423, T. E. & L. Co. Survey	5	Absorption	15,000,000
The Texas Company, Texas Company Bldg., Houston, Texas	J. W. Parks, Section 3373, T. E. & L. Co. Survey	4	Ab. & Com.	10,000,000
Western Gasoline Co., Breckenridge, Texas	W. P. Newell, Section 1174, T. E. & L. Co. Survey	3	Absorption	16,000,000
EASTLAND COUNTY—				
Arkansas Natural Gas Company, American Ex. Bk. Bldg., Dallas, Texas	A. Ussuary Survey, Ranger District	2	Absorption	6,000,000
Chestnut & Smith Corp., 7th & Cheyenne Sts., Tulsa, Oklahoma	M. M. Bush Survey, Ranger District	7	Absorption	4,000,000
Chestnut & Smith Corp., 7th & Cheyenne Sts., Tulsa, Oklahoma	M. Haley Survey, Ranger District	10	Absorption	4,000,000
Chestnut & Smith Corp., 7th & Cheyenne Sts., Tulsa, Oklahoma	John York Survey, Ranger District	5	Absorption	10,000,000
Cremer-Martin Co., 1209 F. & M. Bldg., Fort Worth, Texas	J. T. Carruth Survey, Desdemona District	4	Absorption	2,000,000
Crosby & Sweet, Desdemona, Texas	T. & N. O. Ry. Survey, Block 5, Desdemona District	1	Absorption	†250,000
Desdemona Gasoline Co., 1209 F. & M. Bank Bldg., Fort Worth, Texas	G. E. Moore Survey, Desdemona District	4	Absorption	2,000,000
Finco Gasoline Co., Kennedy Bldg., Tulsa, Oklahoma	J. K. Gyle Survey, Desdemona District	4	Absorption	2,000,000
Gulf Production Company, Gulf Bldg., Houston, Texas	F. W. Taylor Farm, West Ranger District	3	Absorption	650,000
Hall Gasoline Co., 24th floor, F. & M. Bank Bldg., Fort Worth, Texas	J. Salinas Survey, Desdemona District	1	Absorption	500,000
Humble Oil & Refining Company, Humble Bldg., Houston, Texas	L. Ellison Survey, Desdemona District	4	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	T. W. Connellee, John York Survey, Ranger District	4	Compression	2,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	R. S. Harris, Mat Finch Survey, Ranger District	3	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	J. W. Carruth, W. H. Funderburgh Survey, Desdemona District	4	Compression	2,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	E. C. Woodward, G. E. Moore Survey, Desdemona District	3	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	W. R. Carruth, A. Smelzer Survey, Desdemona District	3	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	J. M. Matthews, J. Salinas Survey, Desdemona District	6	Compression	3,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	J. T. McMillan, J. K. Gyle Survey, Desdemona District	3	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	S. E. Reynolds, H. T. & B. Ry. Survey, Desdemona District	2	Compression	1,000,000
McMan Oil & Gas Co., Drew Bldg., Tulsa, Oklahoma	Hamilton Est., Sarah Bibb Survey, Desdemona District	5	Ab. & Com.	1,500,000
Mid-Kansas Oil & Gas Company, 537 S. Main St., Findlay, Ohio	Juana Salinas Survey, Desdemona District	2	Compression	1,000,000
Straits Gasoline Co., Desdemona, Texas	T. & N. O. Ry. Survey Blk. 1, Desdemona District	1	Absorption	500,000
Texas Gasoline Co., (Foote-Nolen), F. & M. Bank Bldg., Fort Worth, Texas	Juana Salinas Survey, Desdemona District	2	Absorption	1,000,000
Universal Products Co., 1209 F. & M. Bank Bldg., Fort Worth, Texas	H. C. Earnest, Section 3, Blk. 4, H. & T. C. Survey, Ranger District	2	Absorption	1,000,000
Arab Gasoline Corp., P. O. Box 997, Eastland, Texas	T. M. Johnson, H. & T. C. Ry. Survey, Blk. 4, Eastland District	—	Absorption	2,500,000
Brown Gasoline Co., Great Southern Life Bldg., Dallas, Texas	W. A. Eakin, W. W. Grimes Survey, Pioneer District	2	Absorption	10,000,000
Invincible Oil Corp., W. T. Waggoner Bldg., Fort Worth, Texas	S. D. Nelson, E. T. Ry. Co. Blk. 2, Pioneer District	2	Absorption	10,000,000
McMan Oil & Gas Company, 5th floor, Drew Bldg., Tulsa, Oklahoma	J. N. Gooch, Thos Benson Survey, Pioneer District	4	Absorption	6,000,000
PALO PINTO COUNTY—				
Lone Star Gas Company, American Exchange Bank Bldg., Dallas, Texas	W. M. Gilbert, eGorge Green Survey, Brazos District	2	Absorption	15,000,000

†Shut Down.

WICHITA COUNTY—

Company and Sales Office Address—	Plant Location	Units	Process	Cu. Ft. Cap.
American Ref. Co., American Bank Bldg., Wichita Falls, Texas	Blk. 84, Northwest Extension Burkburnett field	2	Compression	500,000
Bellby Natural Gasoline Co., 504 Cosden Bldg., Tulsa, Okla.	Ramming farm, H. T. & B. Survey, Clara district	4	Compression	1,000,000
Bellby Natural Gasoline Co., 504 Cosden Bldg., Tulsa, Okla.	S. B. Burnett ranch, Sec. 6, H. T. & B. Sur. Electra field	2	Compression¶	380,000
H. E. Boner, City National Bank Bldg., Wichita Falls, Texas	T. P. Roberts tract, L. Powell Sur., N. W. Burkburnett field	2	Absorption *	2,000,000
Humble Oil & Refining Co., Humble Bldg., Houston, Texas	H C. Herndon, Blk. 58, Northwest Extension Burkburnett field	3	Compression	1,000,000
Humble Oil & Refining Co., Humble Bldg., Houston, Texas	R. Brannon, Blk. 83, Northwest Extension Burkburnett field	1	Compression	500,000
Humble Oil & Refining Co., Humble Bldg., Houston, Texas	J. Serrien farm, H. T. & B. Survey, Clara district	3	Compression	1,000,000
Interstate Gasoline Co., American Bank Bldg., Wichita Falls, Texas	Blk. 74, Northwest Extension Burkburnett field	2	Compression	380,000
Kansas & Gulf Co., Tulsa, Oklahoma	F. W. Huseman Survey, Northwest Extension Burkburnett field	3	Compression	400,000
Kansas & Gulf Co., Tulsa, Oklahoma	Blk. 73, Northwest Extension Burkburnett field	3	Compression	500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	A. C. Horlacker. Blk. 21, Burkburnett field	3	Compression	1,500,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	J. G. Hardin, Wm. P. Dubose Survey A. 335, Burburnett	2	Compression	1,000,000
Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	R. R. Hamilton farm, Electra field	6	Compression	3,000,000
McMann Oil & Gas Co., Drew Bldg., Tulsa, Oklahoma	J. G. Hardin, Wm. P. Dubose Survey A. 335, Burkburnett	2	Compression	1,500,000
Chas. F. Noble Oil & Gas Co., Kennedy Bldg., Tulsa, Oklahoma	G. W. Darvey Survey, Burkburnett field	25	Compression	5,500,000
Chas. F. Noble Oil & Gas Co., Kennedy Bldg., Tulsa, Oklahoma	Blk. 85, Northwest Extension Burkburnett field	10	Compression	2,000,000
Oklahoma Pet. & Gasoline Co., Kennedy Bldg., Tulsa, Oklahoma	Blk. 97, Northwest Extension Burkburnett field	3	Compression	600,000
Omar Gasoline Co., 711 City Nat'l Bank Bldg., Wichita Falls, Texas	T. E. & L. Survey, A-292, North Clara district	4	Compression	1,300,000
Petrolia Gas Company	Wm. Kepler Survey A-170, Burkburnett field	2	Compression	380,000
Sinclair Oil & Gas Co., Tulsa, Oklahoma	J. H. Hadden Survey, North Burkburnett field	5	Compression	2,000,000
W. G. Skelly Interests, Unity Bldg., Tulsa, Oklahoma	W. Ramming, H. T. & B. Survey A-124, Clara district	2	Compression	300,000
W. G. Skelly Interests, Unity Bldg., Tulsa, Oklahoma	G. W. Darby Survey. Abstract 419	3	Compression	600,000
W. G. Skelly Interests, Unity Bldg., Tulsa, Oklahoma	Blk. 87, Northwest Extension Burkburnett field	4	Compression	900,000
Texhoma Oil & Ref. Co., City Nat'l Bank Bldg., Wichita Falls, Texas	A. F. Dodson farm, C. Winters Survey, Texhoma field	8	Compression	537,000
The Texas Co., Texas Company Bldg., Houston, Texas	Blk. 82, Northwest Extension Burkburnett field	2	Compression	350,000
The Texas Co., Texas Company Bldg., Houston, Texas	Northwest part of town of Electra	8	Compression	1,500,000
Tidal-Western Oil Corp., 504 Cosden Bldg., Tulsa, Okla.	J. G. Hardin, E. Lewis Survey, A-372, Burkburnett field	5	Compression	1,500,000
Tidal-Western Oil Corp., 504 Cosden Bldg., Tulsa, Okla.	Blk. 98 Northwest Extension Burkburnett field	8	Compression	2,500,000
Gulf Production Co., Gulf Bldg., Houston, Texas	O. H. Crites, Section 5, H. T. & B. Ry Survey, A-127, Clara district	3	Compression	350,000
Gulf Production Co., Gulf Bldg., Houston, Texas	S. B. Burnett, Section 6, H. T. & B. Ry Sur., A-133, S. Electra district	2	Absorption	350,000
Gulf Production Co., Gulf Bldg., Houston, Texas	R I. Miller, S. P. Ry Sur., A-674, Northwest Electra	2	Compression	200,000
Gulf Production Co., Gulf Bldg., Houston, Texas	A. T. Derden, City of Burkburnett, Outer Blk 16	1	Compression	250,000
Gulf Production Co., Gulf Bldg., Houston, Texas	R. M. Waggoner, Blk. 86, R. R. V. I. Sur., Northwest Burkburnett	2	Compression	500,000

¶Changing to Absorption.
*California Type.

COOKE COUNTY—

Lone Star Gas Company, American Exchange Bank Bldg., Dallas Texas	Gainesville	6	Absorption	40,000,000

CLAY COUNTY—

Lone Star Gas Company, American Exchange Bank Bldg., Dallas, Texas	Block No. 36, Parker County School Lands	2	Compression	380,000
Lone Star Gas Company, American Exchange Bank Bldg., Dallas, Texas	Block No. 36, Parker County School Lands	9	Absorption	50,000,000

WILBARGER COUNTY—

Magnolia Petroleum Co., Magnolia Bldg., Dallas, Texas	Francis Summer, Section 17, H. & T. C. Ry Survey, Blk. 13	2	Compression	1,000,000

YOUNG COUNTY—

Fay Refining Co., South Bend, Texas	South Bend Field	2	Compression	2,000,000
Metric Refining Co., South Bend, Texas	South Bend Field	1	Absorption	2,000,000
Whittier & Wotten Co., 1209 F. & M. Bank Bldg., Fort Worth, Texas	South Bend Field	3	Absorption	2,000,000

Absorption plants	46		
Compression plants	43		
Total	89	Total capacity	377,707,000

Saybolt Decision Upheld by Court of Appeals

Standard again loses in fight against Oklahoma Natural Gas Co. on patent

By A. V. Bourque
Secretary, Association of Natural Gasoline Manufacturers

The decision of the United States Circuit Court of Appeals Eighth Circuit, filed October 2, 1922, affirming the decision of Judge Williams of the United States Court of Appeals for the Eastern District of Oklahoma in the case of the Standard Oil Company and Hope Natural Gas Company versus the Oklahoma Natural Gas Company means that the manufacturers of natural gasoline have won a notable victory in what is known as the Saybolt case wherein the Standard and Hope Companies sued the Oklahoma Natural Gas Company for infringment of Letters Patent 989,927 to Geo. M. Saybolt dated April 11, 1911, for obtaining naphtha from natural gas. The application for the patent was filed September 1, 1906. On August 31, 1906, Saybolt assigned all his rights in said application to Standard Oil Company to which the patent was issued as assignee. The Hope Natural Gas Company is the exclusive licensee under said letters patent. The suit was filed in the lower court in March, 1917, two years being spent in taking testimony in the case. On April 22, 1919, the case was argued before Judge R. L. Williams and in July, 1921, Judge Williams declared the Saybolt patent invalid and dismissed the complainant's bill. On August 1, 1921, the complainants filed an appeal in the Federal Court of Appeals and that Court, in its recent decision, upheld the trial courts decision that Claims 1 and 2 of the patent were void for want of novelty and patentable invention.

The Saybolt patent has three claims but no infringement was shown as to Claim 3 and it was not considered. Claims 1 and 2 were as follows:

1. "The process of obtaining naphtha from combustible gas of natural origin and underground source of the kind supplied by means of wells and pipe lines to cities for consumption therein, which process consists in subjecting such gas in the requisite large amount on the way from its underground sources to its places of consumption and under a high pressure, not less than about 30 pounds to the square inch above atmospheric pressure, to a naphtha absorbing menstruum, and by the aid of the same under said high pressure effecting the separation in industrial quantity from said gas of a natural gas naphtha liquid at atmospheric pressure and temperature and applicable to the uses of petroleum naphtha of similar volatility, substantially as described."

2. "The process of obtaining naphtha from combustible gas of natural origin and underground source of the kind supplied by means of wells and pipe lines to cities for consumption therein, which process consists in subjecting such gas in the requisite large amount on the way from its underground sources to its places of consumption and under a high pressure, not less than about 30 pounds to the square inch above atmospheric pressure, to a naphtha absorbing menstruum, especially petroleum or hydrocarbon oil as specified, and by the aid of the same under said high pressure effecting the separation in industrial quantity from said gas of a natural gas naphtha liquid at atmospheric pressure and temperature and applicable to the uses of petroleum naphtha of similar volatility, and then recovering the naphtha in liquid form from said menstruum by distillation under a low pressure, not more than about atmospheric pressure, substantially as described."

The specifications which relate to the patent in suit so far as is necessary to the present discussion read as follows:

"This invention relates to the obtainment of naphtha from combustible gas of natural origin and underground source, which gas is obtainable by means of wells sunk into the ground to the proper horizon and is capable of use as fuel. Natural gas wells sometimes do and sometimes do not yield oil also. In oil-yielding gas wells (or to state the matter conversely, in gas-yielding oil wells) the natural gas may rise with the oil; or a separation between them may take place underground. From the wells the gas is piped to the places of consumption, which may be longer or shorter distances away. This natural gas is and long has been obtained and used in enormous quantities. One single well, for example, has been known to yield 36,000,000 cubic feet of gas in 24 consecutive hours. While therefore the naphtha exists in the gas in the form of vapors under small tension and consequently in an attenuated condition and while it composes only a small proportion of the gas, at least ordinarily, the amount varying in the gas from different wells, yet in the aggregate a large quantity of naphtha is daily burned as fuel, along with those combustible constituents of natural gas (hereinafter referred to as the lighter combustible constituents of the gas) which are gaseous at atmospheric pressure and temperature. Naphtha is volatile; but it is liquid at atmospheric pressure and temperature, say 15 pounds to the square inch, and 60 degrees Fahrenheit, or thereabout. It may be defined generally as including all hydrocarbons, and each of them, which are liquid at atmospheric pressure and temperature, and which have lower boiling points than the normal hydrocarbons of burning oil (kerosene). It exists in vapor form in natural gas by reason of its association with the other constituents thereof.

"There exists, and for some years back has existed, a great demand for naphtha. It is mainly obtained from petroleum; and the crude oils from fields developed in recent years contain it in less proportion than does Pennsylvania oil. It is therefore, and for some years has been highly important to enlarge the available supply of naphtha. The present invention has this object in view.

"In accordance with this invention, natural gas, as defined above, is subjected to an absorbent menstruum; by the aid of this menstruum a separation is effected of the naphtha from the lighter combustible constituents of the natural gas; and the absorbed naphtha is afterward separated from the menstruum and is recovered apart therefrom in the form of a liquid product."

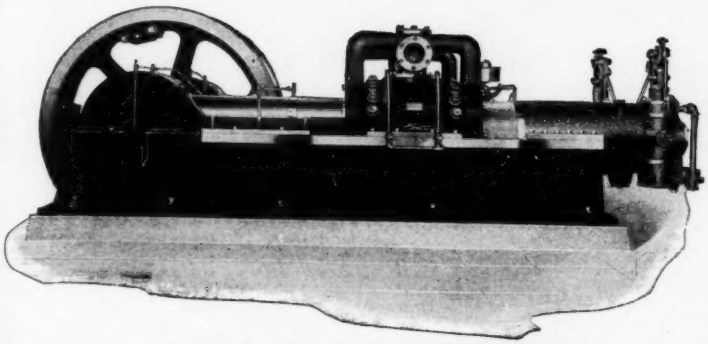
The Court of Appeals in its decision stated that naphtha is a comprehensive term embracing light oils in general and as used in the patent means gasoline. The patent involves the application of physical laws as distinguished from the laws of chemistry and no chemical reactions so far as known take place in the practice of the patented process. A very interesting discussion is found in the brief of counsel for appellants (Standard and Hope Companies) as to the chemistry of hydrocarbons. This discussion is answered in the brief of counsel for appellee (Oklahoma Natural Gas Company). These discussions, however, are not only confusing but they have no relevancy to the validity of the patent, as no chemical reaction is shown in the claims and specifications or in the practice of the patent. The physical laws involved in the practice of the patent read: (a) Subjecting natural gas under a pressure (not less than 30 pounds per square inch), to a naphtha absorbing menstruum (an oil heavier than gasoline) to enable the heavier oil to absorb from the gas the gasoline vapors carried by the gas; (b) the distillation of the menstruum or heavy oil containing the absorbed gasoline to drive off the gasoline vapors which are then cooled and condensed and recovered in liquid form.

"Counsel for appellee claim that the Saybolt process is only a plain application of a pre-existing method of obtaining other liquid hydrocarbons from other gases produced artificially in the destructive distillation of coal and so-called shale, a defense generally termed double use. Saybolt did not claim in his application for the patent in suit to be the inventor of the recovery by absorption of vapors of normally liquid substances entrained in gas. Upon this point these specifications say:

" 'Heretofore appliances of many kinds have been devised for bringing gas into contact with other material with a view of separating one or more of its constituents from the rest of the gas.'

"This language is broad enough to include the recovery of such substances as benzol and shale naphtha from coke oven and shale gas as set forth in the record. It is also admitted that prior to Saybolt's invention it was known that wet natural gas, that is gas sucked up through the casing in the process of pumping oil from oil wells contained gasoline vapor in substantial quantities but it is claimed that Saybolt was the first to discover the presence of gasoline in the dry gas, that is, gas 'supplied by means of wells and pipe lines to cities for consumption therein,' and lean casinghead gas, being gas from oil wels which has been separated from the oil before reaching the casing head, and that his process for obtaining this gasoline in industrial quantities from dry gas was distinctively novel. As the patent in suit covers both wet and dry gas, we think the contention that the process

THE NEW ENCLOSED TYPE



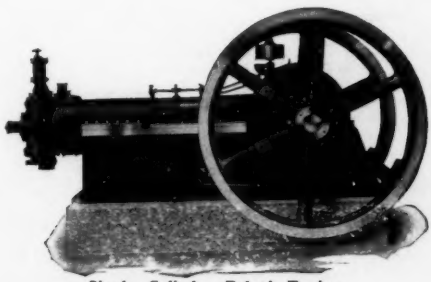
Direct Gas Engine Driven Vacuum Pump, Two Cylinder

Watts-Miller Gas Engines and Direct Gas Engine Driven Compressors and Vacuum Pumps

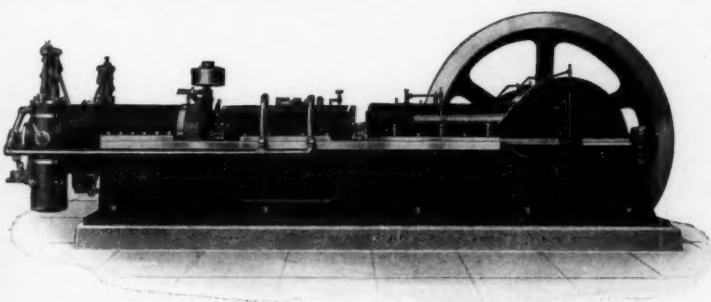
Pat. June 22, 1897; Oct. 6, 1914; April 13, 1915

High Efficiency Gas Engines, Compressors, and Vacuum Pumps for Power Plant Equipment

Sizes from 25 to 400 h. p.



Single Cylinder Belted Engine



Direct Gas Engine Driven Compressor, Two Cylinder, Single or Two Stage

Compressors particularly adapted to casing-head gasoline plants, gas pumping plants, and compressed air installations, in single and 2-stage machines to operate on practically all intake and discharge pressures.
Continuous circulating filtering automatic oiling system.

The Miller Improved Gas Engine Company

SPRINGFIELD, OHIO

DISTRIBUTORS

Tulsa, Oklahoma, Office and Warehouse,
323 North Cheyenne Ave.,
Tulsa, Okla.

Woodlief-Greenwood Engineering Co.,
219 Cotton Exchange Building,
Dallas, Texas

relates wholly to dry gas rather than wet cannot be maintained. In practice the process is used in the treatment of dry gas. The evidence shows that prior to the application of Saybolt in 1906, it was known that gasoline was present in dry natural gas. It may be true that before that time the presence of gasoline in dry natural gas in commercial quantities was not known, but Saybolt did nothing to enlighten anyone on this matter. There is no evidence that he ever practiced his process before his application of afterward, hence it cannot be said that Saybolt discovered the presence of gasoline in dry natural gas in commercial quantities. It was not until the appellant Hope Company experimented with the process in 1912 or 1913, that it was found that by the use of the process gasoline could be obtained from dry natural gas in sufficient quantities to be commercially profitable, if the price of gasoline was high enough. Moreover, we fail to comprehend how the quantity of gasoline to be obtained from dry natural gas can be credited to the patented process. The amount of gasoline to be obtained necessarily would depend upon the amount of gasoline vapor held in the natural gas treated and the pressure at which the gas passed from its underground source to its places of consumption. Henry's law known since 1803 states that the amount of gas dissolved by liquid is proportional to the pressure to which the gas is subjected. This same law proves that the greater the pressure the absorption is conducted under in the Saybolt process, the more gasoline is absorbed by the absorber menstruum and the greater the quantity of liquid hydrocarbons finally obtained. The operation of the law was not novel and could have been predicted without experimentation. It appears from the evidence in the record that the usual pressure of natural gas as it flows from the wells through the pipe lines to the cities for consumption averages 300 pounds per square inch and that this pressure is fixed by the requirements of the transportation system. That the pressure is not created or fixed for the purpose of extracting the gasoline content of the natural gas by absorption but is fixed or created for the purpose of maintaining pressure upon the pipe line system that will transport the gas to the distant markets. It further appears from the evidence that the pressure used on natural gas for the purpose of obtaining gasoline by absorption is whatever pressure that exists on the transportation system where the absorption plant is located. The claims of the patent require the natural gas to be under a pressure of not less than 30 pounds per square inch above atmospheric pressure but Saybolt knew from the law of Henry the function that pressure would perform in the absorption of gasoline vapor from natural gas. The pressure of the natural gas already existed to the knowledge of everyone. If the natural pressure of natural gas as it comes from the wells is not sufficient to properly carry the gas to the cities for consumption then compressors are used to increase the pressure and force the gas to its destination. Whether the gasoline actually obtained from natural gas can be handled at a profit would depend upon the cost of obtaining it and the price at which it could be sold, the latter depending upon the supply and demand therefor. It satisfactorily appears from the evidence that there was no particular need in the industrial arts for the patented process to produce gasoline from natural gas at the time Saybolt filed his application, the ordinary method of refining being sufficient to supply the demand. At the time of the Saybolt application the production of gasoline was 7,000,000 barrels, being an increase in approximately six years of 314,817 barrels, and the records show that if there had been a demand therefor, more gasoline could have been produced by refining, because after 1906 when the automobile industry began to assert itself, a greater amount of refined gasoline was produced than before. In 1880 the price of gasoline was $1.65 per barrel, in 1890 $1.81 per barrel, in 1900 $2.39 a barrel, in 1905 $3.08 per barrel, an increase from 1880 covering a period of 25 years of $1.27 per barrel. The record also shows that in 1905 only 85,000 automobiles propelled by gasoline motors were being used, while in 1910 there were 400,000 in use. The Hope Company did not put the patented process into operation until July, 1913, after a period of seven years and ten months from the date of Saybolt's application when the number of automobiles had increased to 1,010,483, and gasoline had reached the price of $4.29 per barrel. These facts greatly impair the force of the statement in the specifications that, 'there exists and for some years back has existed a demand for Naphtha.' From the facts stated we do not think it can be claimed that Saybolt established any new industry, because prior to his application gasoline was being produced by the ordinary method of refining sufficient for all industrial needs and it was not until over 7 years after the application when automobiles driven by gasoline motors increased in great numbers that the demand for gasoline became such as to make gasoline obtained by absorption commercially profitable. The idea of obtaining gasoline from natural gas under pressure was not new as the natural gas which Saybolt described was always under either natural or artificial pressure on its way to the citites for consumption and the pressure only affected the quantity of gasoline produced, which fact was well known. The proceedings of the Patent Office which resulted in the allowance of the Saybolt claims throw light on the question at issue. The record shows that Saybolt's application as originally filed had 32 claims, 16 for the apparatus and 16 for the process. Claim 1 of the process claims as originally filed is a sample of the other process claims and reads as follows:

"'The process of obtaining naphtha from combustible gas of natural origin and underground source, consisting in subjecting such gas to an absorbent menstruum and in effecting by the aid of such menstruum a separation of natural gas naphtha from the main body of the lighter combustible constituents of the gas, substantially as described.'

Patent Underwent Many Changes

That there was some doubt as to the validity of the Saybolt patent is evidenced by the fact that the patent office from October 8, 1906, to February 11, 1910, took exception to some of the claims of Saybolt and it was not until the application for patent had been reduced from 32 claims as originally filed to three claims that the patent was finally granted as of April 11, 1911. In the decree of the court "This record shows that the patent was finally allowed on the three claims mentioned because they contained the words, 'under a high pressure not less than about thirty pounds to the square inch above atmospheric pressure.' We have heretofore shown that Saybolt had nothing whatever to do with applying pressure to the natural gas but simply to the gas at high pressure in the lines as he found it, and that in a gas transportation system a high pressure is considered for transportation purposes solely. We do not think that the language above quoted distinguished Saybolt's claims from the prior art especially when we consider that he had nothing whatever to do with the pressure which existed prior to his entrance into the field." The decree further says, "Absorbing and recovering the volatile hydrocarbons from gases resulting from the coking and charring of coal, wood, and similar substances at high temperatures, by causing the oils to circulate through an apparatus, wherein after absorbing the vapors from the gases the whole or part of the oils are subjected to complete or partial distillation, and caused to part or partially part with the hydrocarbons absorbed, so that the oils may be returned to the absorbing vessel again in a fit state to take up fresh quantities of hydrocarbon vapors, substantially as herinbefore described and shown in the accompanying drawings."

"The recovery of the volatile hydrocarbons from gases resulting from the destructive distillation of coal, shale, and similar bituminous substances, and from the coking or charring of coal, wood, and similar substances at high temperatures, by compressing such gases in the presence of an oil capable of absorbing the suspended vapors of the hydrocarbons, and cooling the obsorbent oils by the action of the expanded gases thereon, substantially in the new or improved manner hereinbefore described and shown on Sheet 2 of the Drawings hereunto annexed."

The title of the Young patent is "Improvements in Obtaining Hydrocarbon Vapors from gases, and in the Apparatus employed therefor." The object of the invention is stated as follows:

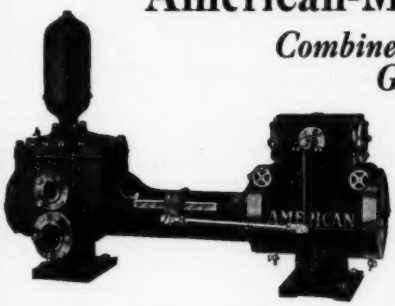
"My said Invention has for its object the more perfect removal and collecting of those hydrocarbons diffused through the gases produced in obtaining mineral oils from coal, shale, peat, and analogous bituminous substances, as well as in the processes of coking coal, peat, or charring wood."

The record shows that coal, shale, petroleum and natural gas are analogous bituminous substances. The Young patent describes a process which so far as we are able to discover is for all practical purposes the same as the Saybolt process and in this connection it must be borne in mind that we are dealing with a process and not an apparatus. Counsel for appellants seek to distinguish the old absorption process from the Saybolt process by showing the differences in the relations of the vapors desired to be recovered from coke oven gas and shale gas and those to be recovered from natural gas. If the process is the same, we fail to understand how the composition of coke oven and shale gas and the composition of natural gas affects the question to be determined in any way. The process recovers the vapors whatever their composition and even if there be a difference in the composition, Saybolt was simply applying the old process to a new use.

XUM

American-Marsh Refinery Pumps

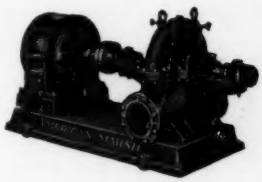
Combine High Efficiency With Great Durability



American-Marsh Pumps meet the demand for strictly high grade high efficiency units where absolute reliability over a long term of years is essential. Their heavy, rugged construction with extra wide passages and large valve areas make them ideal for handling oil and other heavy liquids.

The steam pumps are fully bronze fitted. Heavy cradle yokes are furnished between steam and water ends instead of tie rods, making expensive drip pans unnecessary.

American-Marsh Centrifugal Pumps are made in many different types, some of them especially designed for refinery work. Capacities range from 5 to 5000 gallons per minute and heads up to 250 feet.



The line includes:

Boiler Feed Pumps
Vacuum Pumps
Jet Condensers
Deep Well Engines
Air Compressors
Centrifugal Pumps
Oil Pumps
Acid Pumps

Write for General Catalog

American Steam Pump Co., Battle Creek, Mich.

PAINT—*Factory to You*

"DEPENDABLE QUALITY PAINTS FOR EVERY PURPOSE—A CAN OR A CARLOAD"

Manufactured in our own Factory, equipped with highest type mills, under careful, expert supervision. Our Paints meet the most exacting industrial and railroad tests. THEY STAND UP.

Your inquiries and orders will receive prompt and courteous attention.

AMERICAN PAINT & SUPPLY CO.

Manufacturers of Paints

Factory and Office—DALLAS, TEXAS

which was not invention. The element of pressure is also a part of the process described by Young."

"It is claimed by counsel for appellee that the vent tank shown in the drawings of the patent in suit is a vital element in the apparatus for carrying out the absorption process, but Saybolt made no claim that the vent tank was necessary, and counsel for appellants state in their brief 'The step of preliminary distillation in the vent tank *** is not specifically made an essential step of the process defined in the patent claims.' We therefore think the use of the vent tank is optional. In conclusion the court finds as follows: 'We are satisfied that Saybolt discovered nothing new, that he simply applied an old and well known process to a new use which produced no new result or an old result in a better and easier way. It is not a patentable invention to apply old and well known devices and processes to new uses in other and analogous arts'."

May Annul Other Patents

The decision of the court will probably have an important bearing on Patent No. 1,299,455, dated April 8, 1919, a process of obtaining gasoline from hydrocarbon gases issued to Jas. B. Garner of Pittsburgh, Pa.; No. 1,323,837, dated December 2, 1919, a process of obtaining gasoline from hydrocarbon gases, issued to Howell G. Cooper, Clarksburg, West Virginia, and 1,332,290, a process of obtaining gasoline from natural gas issued March 2, 1920, to Jas. B. Garner and Howell G. Cooper, all assigned to the Hope Natural Gas Company, which are alleged to be efforts by employes of the Standard Oil Company to bolster up the Saybolt patent. While it is not certain that the defeat of a foundation patent would necessarily mean the defeat of subsidiary patents thereon, but such a defeat of a foundation patent would go very far in that direction. There seems to be but one course left for the Standard Oil Company and Hope Natural Gas Company and that is to present the matter to the supreme court of the United States on a writ of certiorari. These writs are granted, however, only where the lower courts seriously disagree with one another, where the welfare of the nation is involved, and where justice has not been afforded in a lower court or where an impartial trial cannot be had in a lower court, none of which seem to apply in this particular case.

The decision of the Circuit Court of Appeals was before Garland and Lewis, circuit judges, and Munger, district judge. Judge Garland delivered the opinion of the court. Appearing for the Standard Oil Company and Hope Natural Gas Company were Marshall A. Christy and Livingston Gifford, (Mr. Bayard H. Christy was with them on the brief). For the Oklahoma Natural Gas Company were Geo. A. Prevost and Frederick P. Fish. The total cost to the Oklahoma Natural Gas Company for defending the suit is upwards of $110,000. The Oklahoma Natural Gas Company was singled out to defend the suit "on account of the fact that you are doing such a large gas business in the West, with a reputation all through the Mid-Continent field as well as through the Eastern fields, we find that other people hold back and do not sign our contracts because they feel protected by your example. This is our chief reason for desiring to come to a prompt and definite conclusion with you, rather than selecting some other firm or company operating by infringement." (Extract from a letter of June 6, 1917, from John S. Pew, then Vice-President of the Hope Natural Gas Company, to Glenn T. Braden, then President of the Oklahoma Natural Gas Company.)

Might Have Been Any Company

The Oklahoma Natural Gas Company when so selected was not, and is not now, a large producer of gasoline, its gasoline plants being in the main erected for the purpose of drying the gas passing through its lines, and there is no doubt, due entirely to the vigorous defense of Mr. Braden in behalf of his company, that the decisions favorable to the other natural gasoline manufacturers of the company were secured. It is understood that while all manufacturers have greatly benefitted only a few have contributed toward the costs of the case. There are still a great many who have not helped financially and it is understood a movement is on foot to bring the matter to the attention of those who have not contributed with the idea of having them help defray the costs of the defense of this case.

Wichita, Kans.—Operations at the new refinery of the Great Western Petroleum Company at Florence, Kansas, are expected to begin about November 15. The plant has been completed at a cost said to be around $200,000 and has a rated

The company operates a fleet of tank cars and a loading rack has been built at the Florence plant. The plant will be equipped to turn out gasoline, kerosene, naphtha, distillate and fuel oil.

Further Advance Expected in Tank Car Rentals

Further advance in tank car rental charges is, according to authorities, not only possible but probable.

There is, however, one way of insuring yourself against another advance—that is by anticipating it. By entering into a long-term lease now to take care of present and future requirements, you will secure present rates regardless of contingencies.

North American cars are available in all sizes and styles; they are kept in tip-top shape in our own shops at Coffeyville, Kan., and Chicago. Full information will be furnished on request.

North American Car Co.

327 S. LaSalle St., Chicago

Coffeyville, Kansas 1003 Daniel Bldg., Tulsa Okla.

PERSONNEL OF THE INDUSTRY

W. D. RICHARDSON,
President of the recently organized Richardson Refining Company.

Accompanied by a party of Europeans who are in the United States on a business tour, Dr. A. S. Ramage, inventor of the Ramage process for refining oils, was in Tulsa in October as a guest of officials of the Barnsdall Oil Corporation. With Dr. Ramage were Prof. Emile Cameron of Brussels, Dr. Schmidtz of Belgium, who is connected with an oil concern in that country, and Count G. de Cippico of Paris, who is general manager for the Ramage process abroad. After landing in the United States Dr. Ramage proceeded to Detroit, where he inspected the Ramage experimental plant there. From Detroit he came to Oklahoma, where he visited the Barnsdall refinery at Barnsdall, to see the process in operation. The party returned to the East from Tulsa.

George N. Moore, president of the Moore Refining Company of Arkansas City, Kansas, while in Chicago recently reported the company's business to be holding up well and that sufficient crude was being obtained to keep the plant going. Mr. Moore was formerly president of Shaffer Oil and Refining Company in Chicago.

Walter G. Willard, field secretary of the Western Petroleum Refiners Association, has resigned his position, effective November 1.

Arthur A. Grant has resigned his position with the Sinclair Refining Company at New Orleans to become connected with the Jahncke Dry Docks, Inc., of that city. Grant was vice president and southern director of Sinclair and had charge of the repair work of the company's ships and formerly was a member of the survey division of the United States shipping board.

A. M. Pate, formerly with the Oriental Oil Company of Dallas, has become connected with the Panther Grease Manufacturing Company, Inc., of Fort Worth. The Panther Grease Manufacturing Company operates a complete plant at Fort Worth.

Carl McGee, superintendent of the Noble Oil & Gas Company's gasoline plant at Quay, Oklahoma, was in Texas last month looking over the various fields in the Central North district.

Hubert May, member of the firm of A. Beeby Thompson & Partners, petroleum consulting engineers of London, was in Pittsburgh during the month enroute to an inspection of oil fields in the southwest and California.

W. H. McFarland, vice president of the Marland Refining Company, Ponca City, is on an extended hunting trip in Colorado and New Mexico. At last reports four bears had been bagged.

Holger Jensen, vice president and sales manager of the Spencer Petroleum Company, Chicago, has recently completed a two weeks trip to the Southwest. Mr. Jensen visited Kansas City, Tulsa, Wichita Falls, Fort Worth, Dallas, Shreveport and St. Louis, and reports a pleasant as well as a profitable trip.

E. H. Klase, formerly with the Indian Refining Company and Calumet Refining Company, has recently taken charge of the Minneapolis sales office of the Fred G. Clarke Company of Cleveland, Ohio.

E. R. Perry, vice president and general manager of Cosden & Company, Tulsa, Oklahoma, has resigned his position, effective January 1, 1923, and will become actively associated with the Moore Refining Company, Arkansas City.

C. W. Shearer, vice president and general manager of the Deepwater Oil Refineries, has returned to his headquarters in Houston, Texas, after a month's motor trip through the central states. The Deepwater has a plant on the Houston Ship Channel.

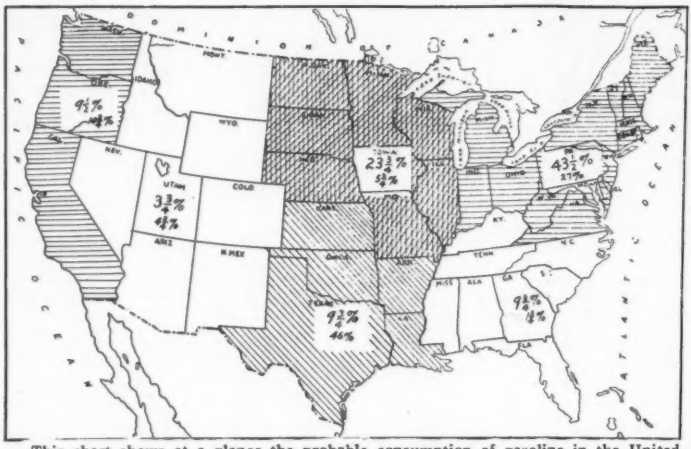
Arthur E. Hurley, president of the Hurley Gasoline Company, was in Tulsa during the past month from Los Angeles. He was accompanied by his wife and expects to stay in the oil capital for several months.

J. C. Bertsch, of the Bertsch Construction Company, Tulsa, Oklahoma, was suddenly taken ill in Bradford, Pa., early in the month and was removed to the Bradford hospital. Mr. Bertsch was in Bradford for the purpose of installing a Bertsch process in the gasoline plant of Johnson and Simpson, at Simpson, Pa.

Sheldon Clark, of the Sinclair Refining Company, has returned to his headquarters in Chicago, following a visit to eastern points. While away Mr. Clark attended the meeting of the National Petroleum Associ[illegible] held at Atlantic City last month.

C. C. Calvert, assistant manager of the Bolene Refining Company, Enid, Oklahoma, returned about the middle of the month from a hunting trip at Holyoke, Colorado.

A. A. Mulkin, of the natural gasoline and refining department of the Texas Company with headquarters at Ft. Worth, was in Wichita Falls during the month on company business.



This chart shows at a glance the probable consumption of gasoline in the United States and has been prepared by the statistical department of the Western Petroleum Refiners Association here. The percentage of the United States' total being indicated by the larger figures and the refining capacity of the various sections as taken from the Bureau of Mines is indicated by the smaller figures.

During the twelve months ended June 30, 1922, the output of refineries in Kansas, Oklahoma, Texas, Louisiana and Arkansas included 42 per cent of the total gasoline production of the country. The figure for August 1, 1922, was 41 per cent.

Dangers of Explosion in Making Repairs on Tanks

Washington, D. C.—Of the various refined petroleum products, only the lighter distillate vapors, gasolines, and kerosenes commonly explode at ordinary temperatures, states the Burea of Mines. Tanks or bunkers that contain these liquids, or even traces of residues, may be in condition to blow up at the slightest spark or flame. Explosive vapors may travel along air currents considerable distances like an invisible stream, or they may slowly diffuse in still air. Should they meet a flame or hot object and become ignited, the flash can travel back over the vapors as on a fuse and set off the original material. Many explosions originate by vapor streams traveling to remote fires. Though heavier oils may not produce explosive mixtures with air at ordinary temperatures, nevertheless when heated they may do so. During the repair of oil tanks and bunkers fire or heated materials are almost indispensable. The heat may volatilize traces of oils thus producing explosions. The danger of explosion always attaches to the repair of tanks that have contained oils of any kind. The greatest caution and care to avoid explosions should be employed regardless of the supposed impossibility of generating dangerous vapor-air mixtures at prevailing temperatures.

Reduced Rate Schedules Suspended by Commission

Washington, D. C.—Certain schedules which proposed to establish reduced proportional rates from the Beaumont-Port Arthur-Houston groups on petroleum and its products (except crude and fuel oil) to New Orleans when final destination is not in designated states has been suspended by the Insterstate Commerce Commission from October 8, last, to February 5, 1923.

The proposed rates would have been 14 cents per 100 and 12½ cents per 100 on crude and fuel oil to New Orleans when final destination is in states other than Alabama, Florida, Georgia, Mississippi, North and South Carolina. The commission also has suspended schedules which proposed to establish joint rates from the same groups to points in Western trunk line and Central freight association territories.

Another Gasoline Plant For Signal Hill Field

Los Angeles, Cal.—The California Gasoline Company, a recently organized concern has started work on an absorption gasoline plant in the Signal Hill district. The new plant will be able to handle 8,000,000 cubic feet of gas a day. It is expected to have the plant in operation during the early part of November.

Augusta, Kansas.—Two natural gasoline plants are being constructed in the Fox-Bush field.

The Tidal Gasoline Company is building one in the south part of the field on property recently acquired by the Tidal-Osage Company from the Magna Oil and Refining Company.

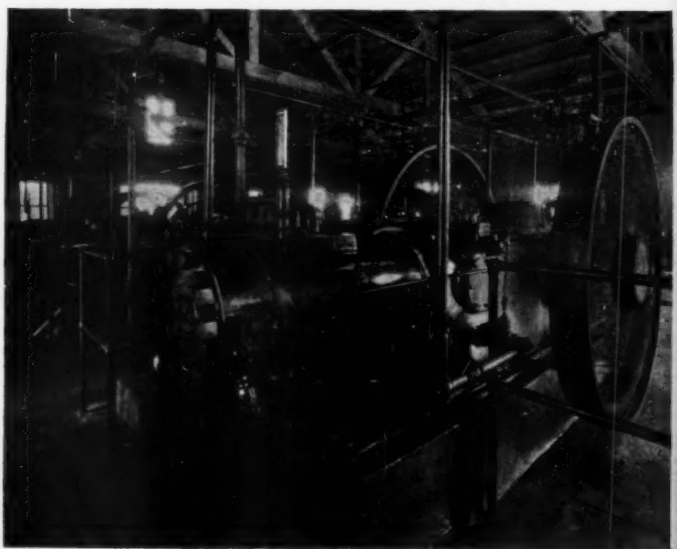
The Lewis Oil Company will have its plant on the north side of the field operating within a month. This plant is of five units and will handle 5,000,000 cubic feet of gas daily.

Cars Repaired by North American at Tulsa Plant

Tulsa, Okla.—Installation of machinery for making repairs to tank cars now is under way at the plant of the North American Car Company in West Tulsa. The company has a 30-acre site across the Arkansas river which adjoins the refinery works of Cosden and Company. Godfrey M. Brigham who has been connected with the North American's plant at Coffeyville, Kansas, will be in charge of the West Tulsa works.

In addition to repairing tank cars under lease by refiners in this district, the North American will also be in a position to handle their own cars as they pass through West Tulsa and keep them in first class condition.

George F. Brigham of Tulsa, is district manager of the North American for the Southwest.



View of a Bessemer 50 horsepower engine in the Gypsy Oil Company's gas station No. 21, which ran continuously from June 6, 1921, to July 14, 1922.

? QUESTIONS ANSWERED ?

What is Paraffine Distillate and how is it produced?

Paraffine Distillate is a product of a paraffine base crude and is a mixture of paraffine and oil. Usually the distillate is manufactured in the first run of the crude. This cut is a "cracked" product which is deemed essential by refiners in order that the amorphous wax may be converted into the crystalline form, this being necessary to secure the best results in a subsequent operation known as pressing. When the lighter products of the crude have been distilled, including the first portions of gas oil distillate that naturally follow the kerosene, the cut for paraffine distillate begins which is usually about 40 cold test and continues until the waxy portions become too heavy and mushy.

How much fuel oil is required for a thousand barrel still charged with crude oil?

The amount of fuel necessary for a run of a still of this size will vary with the furnace construction, the type of crude run, method of distillation and the average boiling point of the crude.

What is meant by free acid in lubricating oils?

By free acid in lubricating oils is meant whether or not any sulphuric acid has been left in the oil due to improper methods or refining. Sulphuric acid is used to remove the tar and impurities in lubricating distillates and if the operation is not carried on as it should be there is a chance for free acid to remain in the oil. In the earliest days of refining, the industry was in a rather crude stage, perhaps some acid was unintentionally left in the oil. However, in these times the operation is watched very closely and extreme caution is exercised not to allow any free sulphuric acid to remain in the lubricating oils.

What is meant by a "cracking?"

Cracking is merely a practical application of the very general rule that all compounds of any organic nature will decompose when subjected to sufficient heat. Therefore, the cracking of a petroleum product means that sufficient heat has been applied to desroy portions of the original hydrocarbons and in this destruction, new products have been formed. These new products are of lower molecular weight and of lower volatility or distillation range. Every refiner knows that one crude will crack better than another and this is due to its possessing hydrocarbons of a constitution that yield readily to the decomposition.

What is the offensive odor of cracked gasoline due to?

This offensive odor is primarily due to nitrogen compounds, sulphur compounds and naphthenic acids.

What impurities in sulphuric acid are harmful in treating petroleum oils?

It is well known that the trioxide and pentoxide of nitrogen also selenium compounds will produce marked discoloring effect on refined oil, also to a less noticeable degree the same negative action will be found in treating lubricating stocks. Nitric acid is also harmful. Ordinarily, the organic content of commercial sulphuric acid is not harmful for there is usually a very small percentage.

Is the acid used in a refinery recovered?

Most refineries have acid restoring plants which may be of the pan system or some more improved methods. The acid in any case is first separated from the sludge, the acid gravity ranging from 27° Baume to about 33° Baume.

What is a topping plant?

A topping plant, sometimes called skimming plant, is all that its name implies and nothing more. The crude is usually run in a system of continuous stills and the crude is relieved or skimmed of the gasoline and kerosene that it may contain.

What is the Frasch Method of DeSulphurization?

A description by Bacon & Hamon: "In desulphurizing petroleum according to the process of Herman Frasch, the cupric oxide is mixed with the petroleum distillate in a still equipped with fly-shaft and arms radiating therefrom, to maintain the oxide from adhering to the bottom of the still. Five thousand pounds of cupric oxide are used with the first charge of 1000 barrels of distillate. After 80 per cent has been distilled off a new charge of distillate is added with an additional charge of 5500 pounds of oxide; this is followed by three further runs with 5500, 5500 and 7500 pounds of oxide, respectively, so that 29,000 pounds of cupric oxide are used for 5000 barrels of distillate. The residuum is pumped through a filter press, and the solid product of the filter press is burned free from oil. The dry mixture of oxide and sulphide of copper is then put into a roasting furnace, where it is desulphurized to one per cent or less.

What is Petroleum Ether?

Petroleum Ether is made from the lightest condensates of the crude. These condensates are redistilled several times with the acid of a good tower until the separation is such that the finished product will be fully evaporated at whatever temperature is required.

What is the Granier Test?

The Granier cup is a French instrument used for taking the flash point of burning oils. It consists of a cup about two inches in diameter by one inch deep. In the center of the cup is a small reservoir which contains a wick. There is a fine wire which passes over the end of the wick, either end of which dips into the oil in the cup. The oil in the cup is heated by the conducting of heat from this burning wick through the wire to the oil. The flash point is indicated by a slight explosion in the cup caused by the flashing of the vapors, which is often violent enough to throw open the little cover on top of the cup. A thermometer extends into the oil in the cup, the temperature indicated at the time the puff of explosion occurs being the desired flash point. The thermometer is graduated in both Fahrenheit and Centigrade degrees. Forty-five Granier is equivalent to about 110° F. Abel.

What causes "chattering?"

Chattering is probably caused from the unburned portions of gasoline in the combustion chamber of the motor, passing by the piston rings and diluting the oil, causing it to harden and lose its lubricating efficiency on the bands of the transmission. This allows them to become glazed and carbon to form on the surface of the bands, and when they are drawn against the drum instead of applying equally and softly, they grab hold and let go, causing a vibration termed chattering.

Electrically Driven Centrifuges
Hand Centrifuges
WRITE
WILLIAMS, BROWN & EARLE, Inc.
Manufacturers of Laboratory Apparatus
918 Chestnut St. Philadelphia, Pa.

F. N. WILLIAMS
Petroleum Engineer
Construction, Design, Operation.
Refining troubles corrected.
Refinery management
Expert Refinery personnel supplied
607 Goggan Bldg. Houston, Texas

Oil Conservation Engineering Co.
Petroleum Engineers
Fire Prevention Engineers
Cleveland, Ohio
Texas Office
607 Goggan Bldg:.
Houston, Texas

Future Motor Fuel Supply Under Discussion

Shale oil offers largest source known but utilization will take many years

Prior to 1910 the refineries of the country were able to supply the small demand put upon them for gasoline, from the amount already present as such in the crude. The average yield of naphtha and gasoline stocks from crude in the Unuited States was about 11 per cent. This figure approximately represents the amount of gasoline that could be recovered by ordinary means of distillation under atmospheric conditions.

With the advent of the internal combustion engine, however, it soon became apparent that this source of supply would not be sufficient to meet the enormous demands for motor fuel.

Numerous cracking processes have been developed by means of which the less valuable fractions of the crude are converted into gasoline.

Casinghead Gasoline

The discovery of gasoline in gas lines led to the development of a large casinghead gasoline industry. By blending the casinghead gasoline with refinery naphtha of about 50° Be and 450° F. end point in suitable proportions, a blended product is obtained which serves admirably as a motor fuel. Casinghead gasoline by itself is not suitable as a motor fuel on account of its extreme volatility. It lacks the heavier fractions which are necessary to impart driving power to the fuel.

Properly blended casinghead products are probably more preferable than the straight run gasoline. They contain larger percentages of the low boiling hydrocarbons than do the straight run stocks of the same end point, therefore, possessing superior starting qualities, especially in cold weather.

The terrific rate at which the demand for automobiles is increasing has caused many to pause and wonder where it will all lead to. The use of gasoline is constantly diminishing the supply of raw material, which has taken ages to form, and which cannot be replaced., There is great danger of the supply becoming exhausted.

Several very possible sources of the future supply of motor fuel are being developed, namely: (1) alcohol, (2) coal tar distillate and (3) oil shale.

Alcohol As Motor Fuel

The principal advantage to the use of alcohol as a motor fuel lies in the fact that it is obtained from a source, the supply of which is being renewed from year to year. Whereas the use of gasoline is continually depleting the supply of crude oil, which cannot again be replaced, alcohol from vegetation has an inexhaustible supply of raw material.

The principal source of the present supply of alcohol for this purpose is from black strap molasses, obtained in the refining of cane sugar. In some localities, where an adequate supply of gasoline is not available, motor fuel from this source is being used entirely, and with a considerable degree of success.

Alcohol can also be made from starchy food materials and from waste wood. The rapidity with which certain sections of the country are being deforested, especially throughout the South, and in view of the notoriously wasteful methods employed, an enormous source of supply is at hand, in the tremendous amount of cellulose containing material which is going to waste. There is no doubt that considerable progress will be made in the manufacture of alcohol from this source. When wood, which consists of about 50 per cent cellulose, is treated with acids, it is converted into dextrose, which, on fermentation yields ethyl alcohol. The yield of alcohol from saw dust is about 20 gallons per ton, which is low from a theoretical standpoint, Hilbert[1] places the saw dust. The amount of alcohol obtained on fermentation is entirely dependent on the yield of sugar from the original cellulose material, and the higher the content of this, the greater the yield.

The use of alcohol as motor fuel has certain advantages,[2] "its combustion is marked by cleanliness, and freedom from any carbon deposits in the cylinders. Because it boils at a definite and comparatively low temperature, it can be well distributed in multi-cylinder motors. On account of its low boiling point, it should give no trouble from dilution of crank case oil. Alcohol will stand very high initial compression without knocking, and at high compression its combustion is smooth and highly satisfactory. Because of the high compression at which alcohol may be used the available horsepower of a definite size of motor is much greater with alcohol than with motor gasoline, if each be run at its most economical compression."

On the other hand the use of alcohol presents certain disadvantages, chief among them being the price. The present government regulations in connection with the manufacturing and sale of alcohol must be changed, in order to cheapen its production. The heating value of alcohol is only about 80,000 B.T.U. per gallon, as compared to about 120,000 B.T.U. per gallon for gasoline. It is difficult to start, owing to its low vapor pressure. This may be overcome by blending with casinghead gasoline. but the alcohol and petroleum oil will not blend unless the former is practically free from water The use of a binder, such as benzene, to blend 95 per cent alcohol with petroleum oil is quite successful. Its lower calorific value is almost compensated by the greater compression at which it can be used, a property which is not altered by admixture with 20 per cent of benzol or with gasoline.

Coal Tar Distillates

Benzol and toluol are the two principal coal tar products which are being adapted to use as motor fuel. They were in such demand during the war, that equipment for their manufacture was largely increased. Toluol was especially in great demand as a raw material for high explosives. This resulted in an overproduction of benzol, as its production is incident to that of toluol.

Benzol is the lightest and most volatile of the hydrocarbons derived from coal tar. By itself it is not satisfactory as a motor fuel, for the reason that it freezes at 42° F. The addition of toluol, however, which freezes at about 50° F. below zero, reduces the freezing point of benzol to a satisfactory mark. Blending benzol with petroleum gasoline also reduces the freezing point and gives the added advantage that the resulting mixture more closely resembles gasoline in its behavior in engine carburetors.

Benzol has a higher heat value than gasoline, whereas gasoline has a heat vaule of about 120,000 B. T. U. per gallon, that of benzol is about 150,000 B. T. U. per gallon. Benzol permits the use of leaner mixtures in the carburetor. It has been shown that, given a suitable blend, there is an increase of over twenty per cent in miles per gallon, in favor of the benzol.

The boiling point of benzol is about 175° F. and about 75 per cent will distil off below 212°F. Thus it will be seen that the addition of certain amounts of benzol to gasoline will increase, to a marked extent, the percentage distilling below 212° F.

Engines operated on benzol-alcohol mixtures show a noticeable absence of knocking even on hills at low speeds. They are easy to start, in spite of high compression.

Oil Shale

Long before the drilling of the first oil well at Titusville, Pa., in 1859, the word "petroleum" had been applied to shale oil. Shale has been used for obtaining petroleum in Europe for nearly one hundred years. In this country there are enormous deposits of oil shale in Colorado, Utah, and Wyoming, and similar deposits in Kentucky, Indiana and Ohio. Petroleum is separated from the oil shale by distillation, from which a motor fuel similar to gasoline may be obtained.

European shale yields about twenty gallons to the ton. There are known deposits in this country which yield as high as a barrel of oil per ton of shale. McKee[3] states that in the Green River section alone there are sufficient deposits to furnish more than five times the total world production since the commercial development of well petroleum 60 years ago.

Oil shale is undoubtedly the largest single source of motor fuel available for the future, but at best it will be many years before quantity production from this source can be obtained.

---

[1]Jour. Ind. and Eng. Chem., 13, 1921, 842.

[2]T. A. Boyd, Jour. Ind. and Eng. Chem. 13, 1921, 840.

[3]Jour. Ind. and Eng. Chem., 14, 1922, 847.

RECENT REFINERY PATENTS ISSUED

WASHINGTON, D. C.—The following patents of interest to the oil refining industry have been recently issued by the Patent Office:

Light Hydrocarbons

No. 1,431,246, issued on October 10 to Wilhelm Munder, Eislingen, Germany, assignor, by mesne assignments, to the Chemical Foundation, Inc., a corporation of Delaware. The patent covers the process for the production of light hydrocarbons free from sulphur, asphalt and water, which comprises subjecting heavy hydrocarbons and their residual products to a first distillation at about atmospheric pressure, condensing the vapor, and then heating. with continuous distillation, in an autoclave under a pressure above atmospheric.

Hydrocarbons of Lower Boiling Point

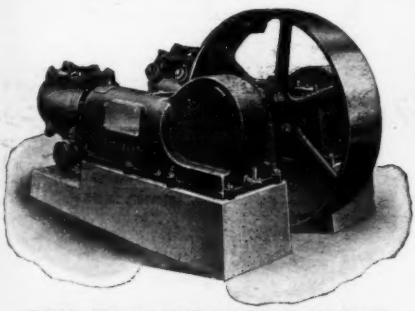
No. 1,431,772, issued on October 10 to John C. Black, Destrehan, La. A process and apparatus for treating hydrocarbons to produce those of lower boiling points, comprising, in an apparatus of the character described, the combination of a furnace, a cracking coil in the furnace, a digester of larger cross sectional area than the cracking coil connected therewith, a series of vaporizing chambers, pressure regulating discharge valves for said chambers, crossovers between adjacent chambers, pressure regulating discharge valves on the crossovers, tubing connecting the first of the chambers with the digester, a pressure regulating discharge valve on the tubing between the first chamber and the digester, and means to pump hydrocarbons into the cracking coil.

In the process of treating hydrocarbons, the combination of steps consisting in heating hydrocarbons to a temperature sufficient to crack them, then reducing their rate of flow while maintaining them under sufficient pressure to substantially prevent vaporization thereof then allowing them to vaporize by successively stepping down the pressure on the liquid hydrocarbons to different predetermined degrees to permit the separate vaporization of hydrocarbons of different boiling points, and separately condensing the vapors of different boiling points.

Treating Carbonaceous

No. 1,432,275, issued on October 17, to Charles C. Bussey, assignor to Samuel E. Darby, New York, N. Y. In an apparatus for treating carbonaceous material for the recovery of the volatile hydrocarbon constituents thereof, an internally tapered retort, a grate surface disposed in the base of said retort to form a support for a column of material contained in said retort, means to maintain an ignited fuel bed in the base portion of the column of material above the grate surface and to control the temperature thereof, and means for drawing off the heated gases and vapor products from the top of the retort, in combination with means to periodically remove in increments and successively in opposite directions the residue of the fuel bed from the bottom thereof above the grate surface, and means to simultaneously supply corresponding increments of fresh material into the top of the retort, whereby all particles of the material to be treated in any given plane normal to the line of progression of the material, are subjected to substantially uniform pressure and speed of progression.

No. 1,432,276, issued on October 17 to Charles C. Bussey, assignor to Samuel E. Darby, New York, N. Y. The process of treating carbonaceous material for the recovery of the volatile hydrocarbon constituents thereof, which consists in maintaining the material to be treated in a vertical column or pile of increasing lateral dimensions towards the base of the column or pile, igniting the base portion of the pile or column of material and maintaining the mass at a point above the ignited portion at a temperature below the cracking temperature of oil, periodically removing the lowermost portions of the



THIS MACHINE SHOWN IN THE UNION OIL FIELD CIRCULAR HAVE YOU SEEN IT?

UNION

CASING-HEAD COMPRESSORS

7—SIZES—7

UNION STEAM PUMP CO.

BATTLE CREEK, MICH., U.S.A.

ignited mass in successive layers thereof, and coincidentally supplying corresponding quantities of fresh material at the top of the pile or column, and passing the evolved vapors and other gaseous products upwardly through and removing the same at the upper end of the pile or column.

Distilling Oil Shale

No. 1,432,101, issued on October 17, to Paul Danckwardt, of Denver, Colo. The process of distilling oil shale which consists in continually charging highly heated waste shale and raw shale into a still, allowing the two portions to mix, whereby heat is transferred to the raw shale sufficient to drive off all the volatile matter, condensing the latter, and withdrawing the waste shale continually from the still.

Extracting Volatile Matter from Shale

No. 1,433,051, issued on October 24 to Willet C. Wells and Frank E. Wells, Columbus, Ohio. The process of extracting volatile matter from shale and the like consisting in charging an annular retort continuously with the shale, heating the shale by applying to both surfaces of said retort the gases of combustion, introducing a neutral heated gas into the body of said shale at the lower end of said retort, and conveying the vapors from said retort approximately at the point of their extraction.

No. 1,433,052, issued on October 24 to Willet C. Wells and Frank E. Wells, Columbus, Ohio. The process of treating oil, which consists in heating the oil in the still having its bottom covered with a heavy inert material fusible but not evaporable at temperatures required, and passing a permanent neutral gas therethrough, passing the resultant mixture of vapors and gas upwardly through a filtering material which has the effect of fuller's earth in removing color and bituminous matter therefrom, said filtering material being maintained at a lower temperature than said oil, and then condensing the vapors.

The process of converting petroleum and the like into commercial products in a still having its bottom covered with a heavy inert material fusible but not evaporable at temperatures required, consisting in inducing a flow of the petroleum through the still by continuously introducing the petroleum thereinto and continuously taking off the asphaltic residue, passing a permanent neutral gas up through said covering material and through the overlying body of petroleum to take up the vapors thereof in their order of volatility as the flow progresses towards the exit, condensing the vapors from the neutral gas into commercial products according to their volatility, and returning the gas to repeat the cycle of operation.

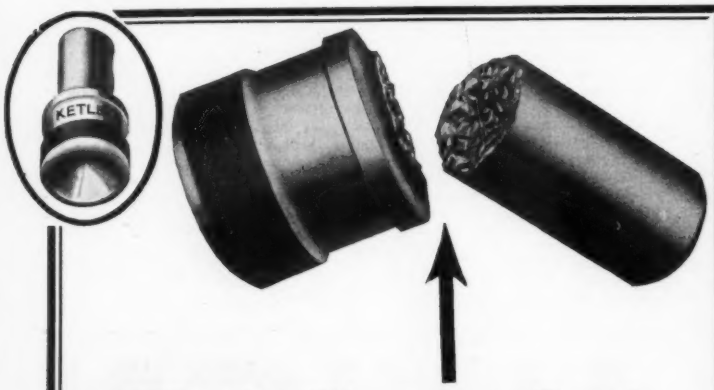
No. 1,429,992, issued on September 26 to Carl V. Woegerer, assignor of one-half to James R. Clarke and one-half to William H. Clarke, both of New York, N. Y. The process of producing hydrocarbons of a less specific gravity from hydrocarbons of a higher specific gravity which consists in subjecting said last named hydrocarbons to an atomizing action with water and lime; then to an atomizing action of steam under pressure and at a temperature below 500 degrees F; then to a settling action under a pressure maintained above that of the atmosphere to separate out a portion of the unconverted oil and lime present; and finally to a condensing action under superatmospheric pressure, substantially as described.

No. 1,430,978, issued to Stephen L. Gartlan, Toronto, Ontario, Canada, on October 3. An apparatus for converting petroleum oil into light hydrocarbon products, which comprises a chamber, means for admitting oil and steam thereto to be mixed, a retort connected with said chamber into which the mixture is expanded, means for externally heating the retort, means for introducing superheated steam at will to the retort, means for expanding the vapors given off under sub-atmospheric pressure, and compressing the vapors into liquefied products, and means for collecting and combining all the products in a common receptacle while still under pressure.

Treating Hydrocarbon Oils

No. 1,433,159, issued to Joseph H. Adams, on October 24, assignor to the Texas Company, Houston, Texas, a corporation of Texas. A process of treating high boiling hydrocarbon oils to obtain lower boiling point hydrocarbons which comprises continuously passing the oil to be treated under pressure successively through a plurality of heating chambers connected in series, maintaining vapor pressure in each of said chambers on said oil, and drawing off vapors from each of said chambers.

No. 1,433,956, issued on October 31 to William John Knox, New York, assignor to Erskine D. Warren, Nek York, N. Y. A method of recovering hydrocarbons which consists in withdrawing liquid hydrocarbon from an oil well, subjecting the same to heat at a point external of the well, returning the heated hydrocarbon to the well at a temperature sufficient to volatize a desired product from the contents of the well, withdrawing the volatilized product while in vapor form, and condensing a desired product therefrom.



Why Do Rivet Sets Break At This Point?

An ordinary rivet set. One day of service. **Snap!** Ready for the junk heap—after driving only 400 to 600 rivets.

Why this break should occur so quickly and so invariably is a question Mr. A. C. Ketler, the man who has erected 11 of the 14 big municipal bridges in Chicago, set out to answer. After 3 years he has found both the answer and the remedy. The result is a rivet set that drives 5,000 to 50,000 rivets.

And yet Ketler sets are no higher in price! In the interest of your pocketbook you owe it to yourself at least to try them. Order by number from the tables below.

KETLER-ELLIOTT CO.

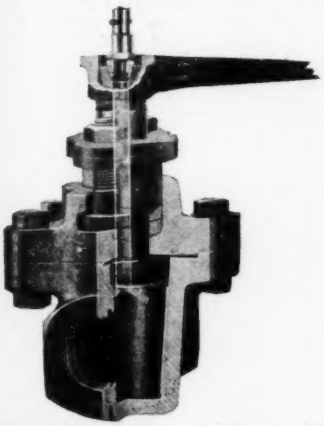
High Grade Structural Tools

3159 S. California Ave., Chicago, Ill.

Order by Number

BUTTON HEAD						CONE HEAD				
No.	Dia. Rivet	Cup Width	Cup Depth	Cup Radius	Price Ea.	No.	Dia. Rivet	Cup Width	Cup Depth	Price Each
3501	3/8	19/32	15/64	5/16	1.50	3551	3/8	21/32	9/32	1.50
3502	7/16	11/16	9/32	23/64	1.50	3552	7/16	3/4	21/64	1.50
3503	1/2	25/32	5/16	13/32	1.50	3553	1/2	7/8	23/64	1.50
3504	9/16	7/8	11/32	29/64	1.50	3554	5/8	1-3/32	15/32	1.50
3505	5/8	1	13/32	33/64	1.50	3555	11/16	1-3/16	33/64	1.50
3506	11/16	1-3/32	7/16	9/16	1.50	3556	3/4	1-5/16	9/16	1.50
3507	3/4	1-3/16	31/64	39/64	1.50	3557	13/16	1-13/32	5/8	1.50
3508	13/16	1-9/32	33/64	21/32	1.50	3558	7/8	1-17/32	21/32	1.50
3509	7/8	1-3/8	35/64	45/64	1.50	3559	15/16	1-5/8	45/64	1.50
3510	15/16	1-15/32	19/32	3/4	1.50	3560	1	1-23/32	47/64	1.75
3511	1	1-19/32	41/64	13/16	1.75	3561	1-1/8	1-27/32	51/64	2.00
3512	1-1/8	1-3/4	45/64	57/64	2.00	3562	1-1/4	1-15/16	53/64	2.25
3513	1-1/4	2	51/64	1-1/32	2.25					

NEW EQUIPMENT. CATALOGS. BULLETINS. BOOKS



Homestead quarter turn lubricated valve

New Lubricating Valve Made for Refinery Use

The Homestead Valve Company, Homestead, Pa., announce that in addition to the many mechanical changes made in the company's line of valves, the Homestead lubricating feature has been added.

In an effort to meet the demands of refiners for valves that will withstand higher pressure and lighter temperatures manufacturers of valves, according to the Homestead Company have adopted various means of taking care of these demands.

The new Homestead Lubricated Valves are similar to the company's regular "quarter-turn" valves in that they are of the plug type, opening and closing with a quarter turn of the handle. The lubricating feature is to protect the seat by a film of oil which prevents the fluid in the line from attacking the ground surface or depositing sediment between them.

The cam construction of the "Homestead" valve has been so changed that the plug is held on the seat but not tightly enough to prevent the valve being operated easily. The cam also locks the valve plug tightly in the seat in the closed position. The cam is of solid metal construction and is closely adjusted to allow the plug to turn easily while at the same time holding it on the seat.

The lubricant can be renewed from time to time. The grooves which carry the lubricant to the surface of the plug are so arranged that they will cover most of the seating surface each time a quarter turn is made. At the same time they never cross the openings of the valve or come in direct contact with the pressure passing through the valve, so that there is no opportunity for the lubricant to drain out or be carried away by the pressure, it is claimed.

The Homestead Valve Manufacturing Company will continue to manufacture their regular line of non-lubricated straightway, threeway, and fourway, and angle valves. Mechanical improvements have recently been made on the entire line. They also manufacture the "Hovalco" Blow-off valve which has a renewable, regrindable, and reversible seat and disc, and is one of the most easily repaired valves made.

A complete new catalog and circulars describing the Lubricated Valve and the general line are now available and will be sent, upon request, to anyone interested.

Foster Improved Absorber Tower Baffle New Addition to Absorption Equipment

TULSA, OKLA., Nov. 4.—One of the new products being offered the natural gasoline industry is the Foster Improved Absorber Tower Baffle, designed and manufactured by D. E. Foster, petroleum engineer of Tulsa. It is designed to afford the maximum of voids, or open space, and at the same time provide increased contact area through the absorption tower.

The Foster baffle is already installed in several absorption plants in Oklahoma and Texas and some buyers have given second orders. Patent has been applied for.

In construction the baffle consists of a series of corrugated steel sheets wound on a common center, each corrugated layer being separated from its neighbor by a flat sheet of similar material. Each baffle can be constructed to any required diameter, having a thickness of 14¾ inches.

Each baffle is pierced by two cast iron rods, spaced 90 degrees apart, passing completely through the section. The rods are washered and riveted at each end. These rods are inserted to make the construction more rigid and to render the sections easy to install and remove from the absorption towers.

Any number of these discs are placed, one on top of the other, in the absorbing tower, the number depending on the length of the tower.

The Foster baffle serves to keep the free space inside the tower as large as possible, at the same time subjecting the gas to a large drop in pressure while passing through the tower but keeping the velocity of the passage low.

At the same time the baffle provides a maximum of surface area within the tower, which allows space for the physical contact of gas and absorbing oil within the tower. It keeps the film of absorbing oil thin, keeping contact of gas and oil spread over a number of square feet of contact surface in proportion to cubic foot area of space occupied by the baffle.

The baffle already has been installed by the Hurley Gasoline Company at Breckenridge, Texas, 6 absorbers, 4 feet in diameter by 60 feet high, capacity of 12,000,000 cubic feet of gas.

The Aztec Oil Company, Ingalls, Oklahoma, two absorbers, three feet in diameter by 56 feet high, capacity of 2,625,000 cubic feet of gas.

Gypsy Oil Company Burbank Oklahoma plant, 8 absorbers, 42 inches in diameter by 30 feet high, plant capacity 10,560,000 cubic feet of gas.

Axtec Oil Company, Henryetta, Oklahoma plant, two absorbers, 30 inches in diameter, 40 feet high.

Lewis Oil Company, Douglas, Kansas plant, two absorbers, 54 inches in diameter 40 feet high, plant capacity 4,500,000 cubic feet of gas.

Oklahoma Gasoline Plants Inc., Drumright, Oklahoma plant, two absorbers, 36 inches in diameter by 50 feet high, plant capacity 2,500,000 cubic feet of gas daily.

A comparison of the Foster product with other baffling materials is shown by the following table.

	*	†	‡
3″ Quartz Cubes	46	12.7	86
Corrugated diaphram rings	65	24.0	48
1″ Raschig Rings	73	58.0	40
Lathe Turnings	94	80.0	25
Staggered Tile on Edge	75	6.4	35
13/16″ Wooden Grids	48	11.8	23
1/2″ Wooden Grids	48	19.5	23
Foster Cartridge	92	120-130	37-39

*Percent Free Space.
†Absorbing Surface-sq. ft., per cu. ft.
‡Weight-lbs., per cu. ft.

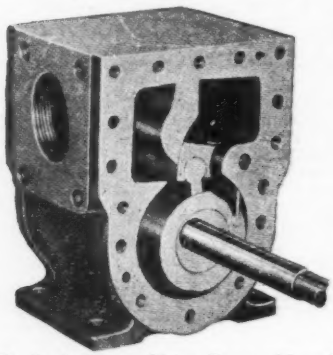
The Foster Improved Absorber Tower Baffle

Fredonia Refinery to Be Finished by December 1

Wichita, Kansas.—Construction work on the refinery of the Red Bird Refining Company at Fredonia in this state is expected to be finished by December 1. The plant will have a rated capacity of 1000 barrels and will be of the lubricating type. The construction work is in charge of J. A. Gray and F. M. Turner, another official of the company, is on the ground acting in a supervisory capacity.

St. Louis Rotary Piston Pump for Refinery Use

For the purpose of meeting the big demand for a simple yet highly efficient and durable pumping equipment for handling oil, chemicals, etc., the St. Louis Pump and Equipment Company has started the manufacture of a new outfit known as the St. Louis Rotary Piston Pump.



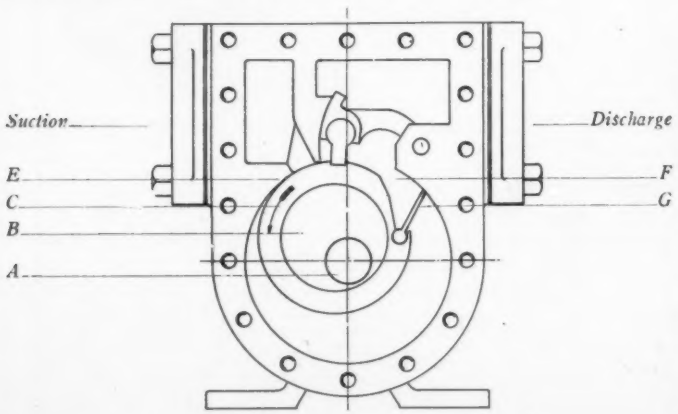
St. Louis Rotary Piston Pump with end plate removed

The new pump, according to its manufacturers, is specially adapted to all kinds of refinery service, handling all stocks from crude to the lighter products and operating equally as well with hot or cold liquids. It is claimed that the pump operates unusually successfully against any commercial still pressure including the cracking process.

The St. Louis Rotary Piston Pump is a duplex pump of twelve major parts, seven of which are movable. The entire mechanism from one pump head to the other is a series of four bearing surfaces of a self-lubricating type.

The pump consists of an eccentric shaft with two eccentrics opposite in the throw (180 degrees apart) operating in a circular pump chamber, one eccentric to each chamber. Surrounding the eccentrics are the fitted bronze pistons which are impregnated to a considerable distance with a permanent self-lubricating compound. Each piston is supplied with a steel support fitting into a rocker arm which directs similar to the cross head of a steam engine, the peculiar and effective piston action that performs the pumping function.

This motion causes each piston to sweep through the pump chamber, slightly clearing the wall of the pump, which its manufacturers claim produces a vacuum when dry of 14 inches to 16 inches of mercury and when sealed by a liquid of from 25 inches to 29 inches of vacuum, and operates against a head pressure in commercial sizes up to 125 pounds and in special sizes to 300 pounds.



Cross Section St. Louis Rotary Piston Pumps.

Ingersoll-Rand Company Has New Air Compressor

The Ingersoll-Rand Company, 11 Broadway, New York, announces a new line of small vertical belt driven air compressors known as Type Fifteen. In addition to the plain belt drive design each size is built as a self-contained electric motor outfit, driven through pinion and internal gears or by employing the short belt drive arrangement. The compressing end and electric motor of both gear and short belt drive units are furnished mounted on a common sub-base.

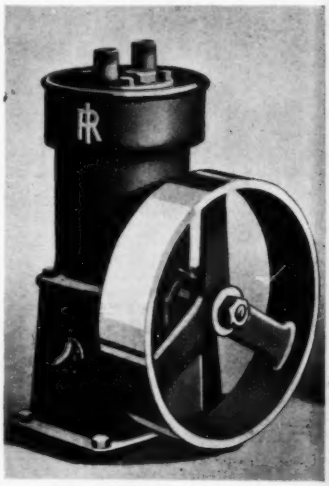
Several new features of construction have been incorporated, of which the "Constant-Level" Lubrication System is the most important. Others include the Constant Speed Unloader for plain belt drive machine; the Centrifugal Unloader for start and stop control machines; and the increased size of the water reservoir cooling pot.

The "Constant-Level" system used in Type Fifteen Compressors automatically maintains a constant-level of oil, which insures the right amount being distributed to all parts.

The Constant Speed Unloader, it is claimed controls the unloading of the compressor by automatically opening the inlet valve when the receiver pressure rises above that at which the unloader is set to operate. When the receiver pressure has fallen a predetermined amount, the unloader automatically releases the inlet valve and allows the compressor to return to work and thus build up the receiver pressure again.

The Centrifugal Unloader according to the manufacturers allows the compressor to start under "no load" such as is essential when automatic start and stop control is used, and permits the electric driving motor to come up to full speed before the load is thrown on automatically. This unloader accomplishes its purposes by holding the inlet valve open until the motor has reached full speed.

A descriptive bulletin has been issued on these compressors which describes in detail all their features including others not mentioned above.



Ingersoll-Rand type 15, vertical belt-driven air compressor

REVISED EDITION OF OIL ANALYSIS PUBLISHED

The tenth revised edition of Oil Analysis, a hand-book for chemist and engineers has recently been published and is now ready for the trade. The book is edited by Augustus H. Gill, S. B., Ph.D., professor of technical Analysis at the Massachusetts Institute of Technology and author of several technical books.

In the new revision a section is devoted to the examination of Motor Gasoline and a description is given of the latest model MacMichael Absolute Viscosimeter. The special tests, methods of analysis and the description of the special oils and greases have been revised where necessary bringing the book up-to-date.

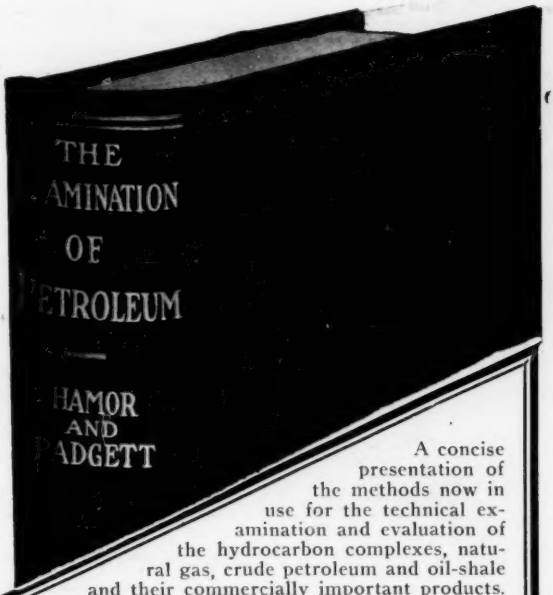
According to its publishers the purpose of Oil Analysis is that of a concise manual primarily for beginners.

The list price of the book is $2.50. Copies can be secured from the Gulf Publishing Company, Houston, Texas.

Founder of Tagliabue Company Passes Away

Brooklyn, N. J.—Charles J. Tagliabue, president and founder of the C. J. Tagliabue Manufacturing Company died at his home in Brooklyn on November 2 following a brief illness.

A Complete Handbook of Analytical Naphthology



A concise presentation of the methods now in use for the technical examination and evaluation of the hydrocarbon complexes, natural gas, crude petroleum and oil-shale and their commercially important products.

The Technical Examination of Crude Petroleum, Petroleum Products and Natural Gases

Including also Procedures Employed in the Evaluation of Oil-Shale, and Laboratory Methods in Use in the Control of the Operation of Benzol-Recovery Plants

Mellon Institute Technochemical Series

By William Allen Hamor, Assistant Director of the Mellon Institute of Industrial Research, and Fred Warde Padgett, Associate Professor of Chemistry, University of Oklahoma.

This concise work makes readily available to chemists and to engineers the procedures of applying the physical and chemical tests which are recognized as essential by technologists. Because of the significance of benzol and of benzol-gasoline mixtures as motor fuels, a chapter is devoted to the laboratory methods in use in the control of the operation of benzol-recovery plants.

Part Two of the book is virtually a data handbook for the mineral oil and natural gas technologist,—presenting all the physico-chemical data required for guidance in evaluating the products considered in the text. The data section is arranged systematically, following the order of the ten chapters of the text, and is complete as to constants, physico-chemical properties, conversion tables, specifications, laboratory equipment, etc.

591 pages, 6x9, 144 illustrations, $6.00 net, postpaid

USE THE COUPON

The Gulf Publishing Company,
Houston, Texas.

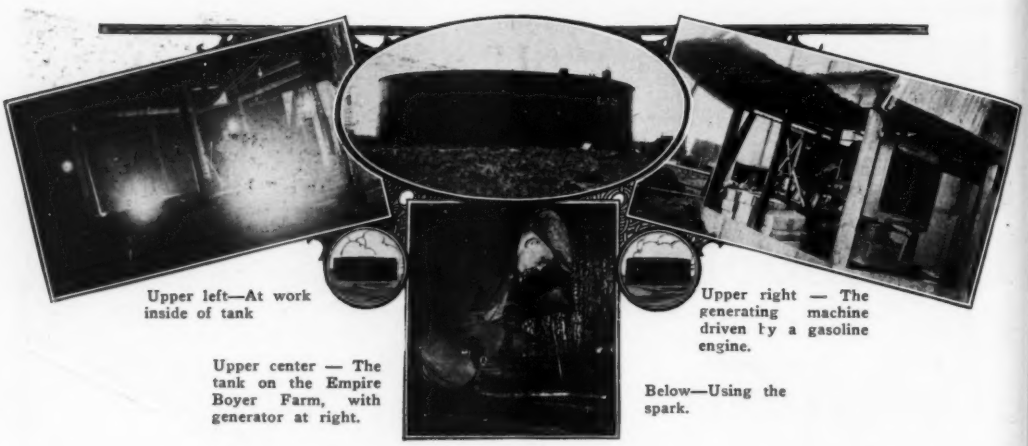
Gentlemen:

Enclosed find check for $6.00 for which please send me postpaid one volume of The EXAMINATION OF PETROLEUM, by Hamor and Padgett.

Name.....

Street and No. .....

City and State.....



Upper left—At work inside of tank

Upper center — The tank on the Empire Boyer Farm, with generator at right.

Upper right — The generating machine driven by a gasoline engine.

Below—Using the spark.

Welding Successfully Repairs Tank Bottom

Electric system used on a job in Kansas reduces cost and saves time

EL DORADO, KANS., Nov. 15.—What is considered the first successful repair job on the bottom of a 55,000 barrel steel tank was recently completed here by the Electra Welding Company of Bartlesville, Oklahoma. The work was done on tank No. 18 on the Boyer farm of the Empire Pipe Line Company in the El Dorado field. The company announces that an inspection was made on the work and it is proving very satisfactory.

The Empire Company set about to find a different repair method, when this tank began to leak so much that it was unfit for further use. The work was put before several welding concerns for bids. With the bids, the company asked for statements as to methods to be used. After considering these, Empire engineers recommended that the Bartlesville firm be given the task. The welding company used the Wilson Plastic Arc method, manufactured by the Wilson Welder and Metals Company of New York.

The contract called for the electric welding of all seams and rivets in the bottom of the tank, totaling 2,867 feet of seams and 22,936 rivets. In addition to this all missing rivets were replaced with welding metal. All worn and badly pitted spots on the tank bottom were built up, being covered with a welded patch.

First the tank was cleaned of all muck and scrubbed with wire brushes. Then all seams and places requiring welding were brightened by use of a sand blast. A section of the tank wall was removed and the generator set up outside, lines being run into the tank for the welders.

The welding machine is equipped with its own power, electricity being generated from a 40 h. p. Hercules gasoline engine, with direct connection to the generator. Power was sufficient to furnish electricity for running two welders simultaneously. The machine was in operation from 12 to 20 hours daily from the date of beginning the work, April 21, until the repair had been completed. It required 1,100 pounds of welding wire to complete the work.

The first test put on the repaired bottom was sufficient water to wave the bottom. When no leaks followed, the tank was filled with water and allowed to stand several days. Again no leaks were found. The Empire company then accepted the work and the tank has been put back in use for oil storage purposes.

The welding process was found to be much cheaper than other methods of repairing leaking tank bottoms. Other methods known to the oil industry are the building of new bottoms and covering the old bottom with concrete.

In the case of rebuilding the bottom, it is necessary to remove the tank roof and cut down the shell, both of which make the task expensive. The concrete method requires the installation of a reinforced concrete slab, on a plain concrete bottom, with protection from an asphalt coating.

So far as the contractors have been able to learn, no previous effort has been made to repair the entire bottom of a tank of 55,000 barrels capacity. Smaller successes from electric welding led to the attempt to repair the whole floor of a 55,000-barrel tank.

TULSA BOILER AND SHEET IRON WORKS
ENGINEERS MANUFACTURERS AND ERECTORS
STEEL PLATE CONSTRUCTION
STACKS, RIVETED PIPING, PRESSURE TANKS, ETC.
BOX 1926 - TULSA, OKLA.
PIONEERS IN MID-CONTINENT FIELD SPECIALIZING ON
CRUDE STILLS, AGITATORS, COND. BOXES
VAPOR TOWERS AND ALL OTHER
REFINERY TANKAGE

Ringling, Okla., Plant To Resume Operations

Oklahoma City, Okla.—Arrangements are being made for resumption of operations at the Ringling, Oklahoma, plant of the Peoples Refining Company. The company recently negotiated for a pipe line which extends from the refinery to the Healdton field. The deal was made with the Twin States Oil Company.

A meeting of stockholders of the Peoples Refining Company will be held in Oklahoma City, October 28.

Enid, Okla.—With the addition of five stills to the refining plant of the Champlin Refining Company here, the daily capacity has been increased to 20,000 barrels.

REFINERY AND GASOLINE PLANT ACTIVITIES

English Concern Will Build Plant in Greece

Athens, Greece.—Propositions have been submitted to the Greek government by an English company for installing in this country a large factory for the working of non-refined petroleum imported from Batoum and Mossoul. The government has instructed the Minister of National Economy to make a study of the propositions submitted.

The English concern has already applied for a site of about forty hectares near Athens, Piraeus or Phalere on which to construct the factory which would give employment to several thousand when final plans are carried out. The company proposes to furnish the Greek government refined petroleum at prices to be agreed on in advance of consummation of the venture.

For the time being final arrangements are being held up pending the outcome of the political situation in Greece.

Gilmore Co. Building Several Gasoline Plants

Tulsa, Okla.—The Forrest E. Gilmore & Company refinery engineers of Tulsa, have four natural gasoline plants under construction in Texas and have just finished one in Oklahoma.

The plant just completed was built for the Pulaski Oil Company of Tulsa, the plant being in the Bristow area in section 3-14-8, Creek County. An absorption type plant was built, having daily capacity of 3,000,000 cubic feet of gas, from which about 5000 gallons of natural gasoline will be taken.

At Eastland, Texas, the Forrest E. Gilmore Company is building one plant from its own finances. It will be an absorption plant of 8,000,000 cubic feet capacity, from which around 15,000 gallons of natural gasoline will be taken daily.

The Texas and Pacific Coal and Oil Company has a plant under construction by the Gilmore concern. This absorption plant near Caddo in Stephens County, will run 10,000,000 cubic feet of gas daily and will turn out 10,000 gallons of natural gasoline.

C. B. Eddie of Cisco is building a 5,000,000 cubic foot plant on a lease of the Swensondale Oil Company property near Caddo.

Across the road from this plant, the Central Gasoline Company of Cisco has a plant of 7,000,000 cubic feet capacity under construction on properties of the Buckeye Oil Company.

Tulsa, Okla.—When three new steam stills, now under construction, are completed the West Tulsa refinery of the Producers and Refiners Corporation will have a daily capacity of 7,500 barrels.

Fidelity El Dorado Plant Taken Over by Richardson

Wichita, Kans.—The Richardson interests of Kansas City, headed by W. D. Richardson, former president of the Meridian Petroleum Company, have acquired the plant of the Fidelity Refining Company at El Dorado in this State and will operate it. The plant was acquired through A. H. Stone, receiver for the Fidelity and has been shut down for more than a year.

It is understood here that J. W. Arnold of Okmulgee, Oklahoma, will have charge of the plant here which will be known as the Richardson refinery. Contracts for Kansas crude have been made with the Empire Gas and Fuel and others in exchange for oil to be furnished in Oklahoma.

The output of the El Dorado refinery will be marketed by the Richardson interests through their Kansas City sales office.

O'Donnell Refinery Ready for Operation

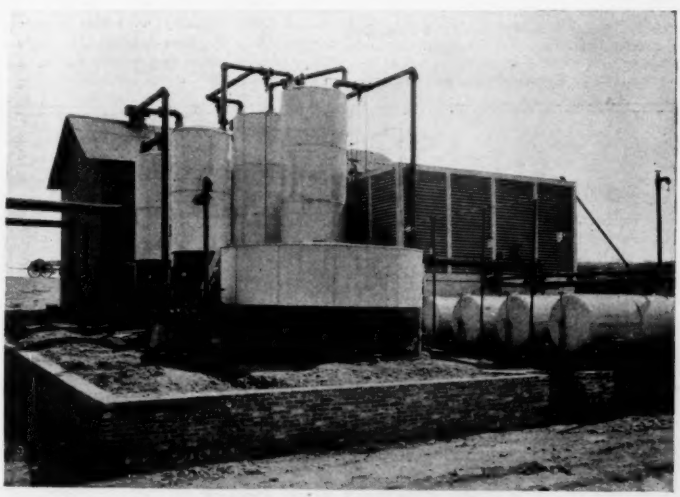
Los Angeles, Cal.—The new refinery of the O'Donnell Refining Company recently started at West Whittier has been completed and is now ready for operation. The Gillons process has been installed.

Marland to Secure Additional Trackage

Ponca City, Okla.—A conference here between officials of the Marland Refining Company and the Santa Fe Railway is expected to result in the affording of additional facilities for handling the business of the refinery. Trackage arrangements and improvements are necessary to permit of the expanding trade of the Marland companies.

The Santa Fe officials after the conference in Ponca City took a trip through the oil fields of northern Oklahoma.

Washington, D. C.—A study of various methods of evaporation and oxidation of cracked gasolines made by the Bureau of Mines leads to the conclusion that gummy and resinous deposits are caused by oxidation, and have no direct relation to unsaturation as determined by solubility in sulphuric acid. In the investigation made by the Bureau a new and convenient method was developed for determining "gum" in gasoline. The study of gums and their formation leads to the conclusion that they are polymerized aldehydes, which probably are formed by the oxidation of olefins, etc. Storage tests confirm the above conclusions. Details of the investigation made by the Bureau of Mines are given in Serial 2394, "Gum-forming constituents in gasoline," just issued.



One of the novel gasoline plants of the Mid-Continent district is that of the Sapulpa Refining Company at Sapulpa built as an adjunct to the company's refinery.

From the receiving house of the refinery, vapors are collected and run to the compression plant nearby, where several hundred gallons of natural gasoline are manufactured daily from vapors, which otherwise would be lost.

Due to the fact that the plant is furnished rich vapors, with no dry gas for residue, a high return is shown by this small plant.

It is a venture that has proven a profitable adjunct to one of the complete refining plants of the Mid-Continent district.

Sinclair's Expansion Program Calls For Improvements at Various Plants

NEW YORK, N. Y.—Development of the refining branch of its business on a more extended scale than ever before is being undertaken by the Consolidated Oil Corporation and the expansion program tentatively decided upon calls for improvements and new installations at New York, Chicago, Kansas City, Coffeyville and Houston points. When completed the refining capacity of the Sinclar plants will be equal to all requirements of the company, including the supplying of the navy with all its refined, lubricating and fuel oils.

Work on the East Chicago facilities of Sinclair is about completed and the operation of the second unit of the palnt is expected to be a fact by the first of the year when both units will be capable of attaining the capacity for which the plant was originally designed, 20,000 barrels daily. The first unit has been in operation some time and is capable of handling 10,000 barrels of crude daily. The refinery at East Chicago was started in 1917.

At Marcus Hook, Pa., Sinclair has a big compounding plant and export terminal and owns land enough to erect a large, modern refinery. The exact capacity of the Marcus Hook plant is not known at this time, although locations are understood to have been made for 30 stills and permanent connections made with the Reading system while the Pennsylvania tracks run through the property. The first unit of the plant will handle 10,000 barrels daily and it is supposed that the eventual capacity of the refinery will be larger, as in the case of the East Chicago project. The company has river frontage of more than 3,500 feet on the Delaware river with a 35-foot channel. An unconfirmed report is that the outlay for the Marcus Hook refinery will total in the neighborhood of some $7,000,000.

There have been no definite plans announced as to the enlarging of the Houston refinery of Sinclair. That this plant undoubtedly will be one of the most important in the chain of Sinclair plants is evident with the completion of the pipe lines from Teapot Dome and the extension to the Gulf from Mexia, Texas. These projects will make the Houston refinery the southern terminus for the Sinclair system and it would appear logical that from this point shipments of fuel oil to the navy could be handled more satisfactorily, so that the Houston plant must be one of the largest. It is believed from the amount of construction under way that the second unit of the Sinclair plant at Houston will be larger than the first.

The Kansas City and Coffeyville plants of Sinclair have been improved. The Coffeyville refinery until now has been given over largely to the manufacture of lubricating oils but recent additions have made it one of the most modern in the Sinclair system and the rated capacity of 5000 barrels will have been attained by the end of December. Crude for the Coffeyville plant will be supplied through the Sinclair Pipe Line Company's extension from Osage County in Oklahoma. The Kansas City plant has been running at 5000 barrels and after present construction work has been completed the output of the plant can be materially increased. The refinery at Kansas City is equipped to turn out anything to be made from crude oil.

Sinclair also has a plant at Wellsville, New York, which has been improved within the last year. The company also has a refinery site at Tremley Point, New York harbor, which is now used as a fuel oil terminal. Present expansion program contemplates the construction of a big refinery on or near this point within the near future.

OIL REFINERY EQUIPMENT

Crude and Steam Stills Condenser Boxes
Agitators Tanks Towers
Walkways and Stairs

Large Stocks of Materials Prevent Delays
Efficient Shop Service

MASHER

STEEL AND MACHINERY COMPANY
DALLAS, TEXAS

Texas Pacific Has Plans For New Skimming Plant

Fort Worth, Texas—The Texas Pacific Coal & Oil Company which maintains headquarters in this city, is formulating plans to construct a skimming plant in the Robberson field, Garvin County, Oklahoma. A number of communities in the country are offering a site for the plant as an inducement to get the company to build. The Texas Pacific Company has considerable acreage in Garvin County, and last month completed a well good for 800 barrels at 1520 feet.

Transatlantic Installs Lube Filtering System

In order to take care of increased business, the office of the Transcontinental Petroleum Co., is being enlarged.

This company is installing a complete lube oil filtering system, and in future will market a full line of filtered lubricating oils.

During the past sixty days this refinery has been overhauled and repaired to be ready for renewed activity.

Phillips Buys Gasoline Plant at Bryant Switch

Bartlesville, Okla.—The Phillips Petroleum Company has purchased the natural gasoline plant of the Iiquified Petroleum Company in the Lyons Pool, according to announcement made by the company. The plant is specifically located at Bryant Switch and is of the absorption type with a daily capacity of approximately 4,000 gallons.

New Refining Concern Incorporated in Texas

Dallas, Texas.—The Buffalo Refining Company, which operates a 400 barrel daily capacity skimming plant at Sherman, Texas, has been incorporated under the laws of Texas with a capitalization of $75,000. Among the owners of the concern are: F. M. Thompson, B. F. Smith and D. L. Cocke.

Additional Stills for Pioneer Guthrie Plant

Oklahoma City, Okla.—Two additional 500-barrel stills are being installed at the plant of the Pioneer Petroleum Company at Guthrie in this state. Crude for the refinery is being obtained from Cushing and Burbank fields.

Judge George Irving of Guthrie is president of the Pioneer Petroleum Company, which already has marketing facilities, and James A. Clark is secretary and treasurer. Clark is manager also.

Wichita, Kansas.—A large number of pressure stills at the Standard Oil Company (Kansas) plant at Neodesha in this state have been closed down. The plant at Neodesha is rated as a 12,000 barrel plant.

Another Refinery for Rio Grande Oil Co.

Los Angeles, Cal.—Announcement is made that the Rio Grande Oil Company, operating refineries at El Paso and Phoenix, will establish a plant in Los Angeles at once. Financing of the plans for the expansion are now going forward.

This company has owned a little plant at El Paso for several years. It has grown from a small beginning to a refining and marketing organization of importance in West Texas and Southern New Mexico and Arizona. Crude oil is shipped to the El Paso and Phoenix plants from the fields of Texas, by tank cars. The company has built up a thriving business by aggressive advertising methods, selling a full line of products under the trade name of "Speedene."'

The Rio Grande Oil Company is principally owned and managed by the Lockharts—father and five or six sons and one daughter. They make a complete organization.

The capital stock of the company is being increased from $500,700 to $1,100,000. With the new funds thus attained, a 3000 barrel refinery will be erected in Los Angeles, together with storage and marketing facilities.

Vickers Petroleum Has Large Expansion Plans

Wichita, Kans. — Tentative expansion plans for the Vickers Petroleum Company of this city includes the increasing of their Potwin refinery and also provides for a larger marketing program. C. L. Henderson, vice president of Sterling Oil and Refining Company, has resigned his position effective the first of the year and after that date will be associated in an executive capacity with the Vickers Petroleum Company.

J. A. Corbett of St. Louis, president of the Sterling Oil and Refining Company, is moving with his family to Wichita where he will make his home and he will assume active management of all properties of the Sterling, which operates a modern refinery at Wichita.

It is probable that the Vickers plant at Potwin will be increased by the addition of stills and the installing of a cracking process, likely the Fleming process which now is in use at the Sterling plant.

Interstate Resumes Work At Iowa Park Refinery

Wichita Falls, Texas, Nov. 7.—The Interstate Gasoline Company resumed operation of its 2,500 barrel daily capacity refinery located on the Fort Worth & Denver Railroad near Iowa Park, Texas early this week. Only about 1,200 barrels of the total charging capacity of the plant will be utilized until more crude is available. The Interstate Gasoline Company, which is a subsidiary of the Haskell Interests, recently completed a four-inch pipe line to the South Electra field, and is using this line to transport crude to the plant. O. H. Berryman will be actively in charge of the operation of the plant, while sales offices will be located at 1010 American Bank Building, Wichita Falls.

Lion El Dorado Plant to Install Burton Process

Chicago, Ill.—Extensive plans for enlarging the company's plant at El Dorado, Arkansas, are near consummation as a result of the Lion Oil and Refining Company of Kansas City closing a contract here with the Standard Oil Company (Indiana) for the use of the Burton cracking process. The Lion Oil and Refining's plant at El Dorado will be one of the largest in Arkansas when the present enlargement program is fully carried out.

F. H. Thwing is president of the Lion Oil and Refining Company and Victor H. Smith, both of Kansas City, is vice president and general manager. With the installation of the eighteen stills the capacity of the plant will be greatly increased.

Montreal Refinery Plans To Operate on Gulf Crude

Montreal, Canada.—According to announcement made by the company, The Red Star Refineries, Ltd., have started work on one of the largest and most up-to-date refineries in the world at Montreal. The announcement states that the Ramage process will be used.

The plant is to be built on the St. Lawrence river, where the company plans to have docks to receive oil by tanker from Mexico and Gulf Coast ports. It is expected to have a daily capacity of 10,000 barrels of gasoline.

An expenditure of approximately $6,000,000 will be made.

New Gasoline Plant for Monroe, La., Gas Field

Shreveport, La.—The Atlas Oil Company announces that its new compression gasoline plant near the town of Swartz in eastern Ouachita Parish has been completed and is ready for operation. The plant will get a supply of gas from the nearby Monroe gas field.

The Atlas Oil Company is controlled by the Potter Palmer Estate of Chicago which also owns the Ebony and Western Carbon Companies that are constructing a carbon black plant adjoining the new gasoline plant.

Tulsa, Okla.—Champlin Refining Company at Enid in this state is erecting ten new steek tanks. The order calls for five 80's and that many 55's.

White Eagle Increases Facilities at Augusta

Kansas City, Mo.—Official information is that the White Eagle Oil and Refining Company is completing an additional unit of cracking stills at its Augusta, Kansas, refinery so as to supply the stations of the Manhattan Oil and Linseed Company which were recently acquired in Minnesota, Wisconsin and South Dakota. The White Eagle also operates a refinery at Fort Worth, Texas, and a lubricating plant at Topeka, Kansas.

The purchase from the Manhattan Oil and Linseed Company includes about 100 bulk service stations in the larger cities of Minnesota, Wisconsin, North and South Dakota and also includes the trade name and organization of the Manhattan. This deal, the consideration of which has not been made public, gives the White Eagle some 350 distributing stations of its own and makes it one of the largest distributors of gasoline and oils in the Middle West.

The acquisition of the Manhattan stations will afford the White Eagle an outlet for approximately 60,000,000 gallons of gasoline a year through its own distributing system. This likely will restrict even more its extensive jobbing business so that additional refinery facilities may later be necessary.

Producers & Refiners May Build Refinery at Rawlins

Denver, Colo.—While official confirmation is lacking, it is understood that the Producers and Refiners Corporation proposes to build a large refinery along the Union Pacific Railway between Rawlins and Fort Steele. It is reported that the plant will have a capacity of at lease 5000 barrels to begin with.

Should a plant be built at this point it will be necessary for the company to lay a line to Laramie River, a distance of several miles.

Knox Cyclic Process for New Plant at Texas City

Houston, Texas.—A tract of 75 acres has been purchased just north of the Vacuum Oil Company's holdings at Texas City by the United States Gasoline Corporation which it is understood plans to build a gasoline plant.

Plans call for a four-unit plant which will use the Knox Cyclic process of cracking. The plant will cost approximately 250,000 dollars.

TULSA BOILER AND SHEET IRON WORKS
ENGINEERS MANUFACTURERS AND ERECTORS

STEEL PLATE CONSTRUCTION
STACKS, RIVETED PIPING, PRESSURE TANKS, ETC.
BOX 1926 - TULSA, OKLA.
PIONEERS IN MID-CONTINENT FIELD SPECIALIZING ON
CRUDE STILLS, AGITATORS, COND. BOXES
VAPOR TOWERS AND ALL OTHER
REFINERY TANKAGE

÷ REFINERY SUPPLIES ÷

Chemical Market Reflects Better Trade Conditions

Chicago, Oct. 31.—The chemical market generally indicates steadily improving industrial conditions. Not only are the majority of chemicals either firm or stronger in price, but in many cases contracting is being done for next year's needs at current prices.

The above is particularly the case as regards caustic soda, which has been enjoying a most phenomenal season. Manufacturers have been operating at capacity to meet a consistent demand which is phenomenal for this season of the year. Prices have not altered within the past month, but makers state they are not making money and are talking of a price increase. It is stated that contracts for next year are being made at current prices.

Among chemicals used by refiners, the exceptions to the general rule of active demand are Sal Soda, Potash Bichromate, Sulphuric Acid. These products nevertheless are finding a fair reception, though prices have weakened very slightly in the past 30 days.

Chlorate of Soda is especially active, and with the imported product rather scarce. Permanganate of Potash is also higher in price due in part to scarcity of imported supplies.

Benzol is slightly higher in price, with practically none to be had. Producers in most instances are sold up far ahead.

Toluol is meeting the demand more satisfactorily than at any time during the past 60 days, and shows a tendency to recede from its high price position slightly.

Transportation is said to be improving, except in the South, where it is still difficult to make deliveries.

Animal and Vegetable Oils Up

The animal and vegetable oil market shows pronounced strength. Practically all products have advanced in price in the past month. Buyers are said to be taking on supplies for two or three months ahead. Some are even buying for six months ahead, to insure against later difficulty in getting supplies,—in view of the excellent industrial outlook.

Soya Bean Oil is an exception to the rule, due to a sharp drop in price at several points of foreign origin and to increased production in the Corn Belt states.

Turpentine Soaring

Naval stores are all enjoying a strong market, and in many cases higher prices. This is partly a result of the unusual activity of turpentine. Stocks of turpentine in the hands of dealers and consumers have been consistently small. As the close of the producing season has approached the price has advanced steadily, and since October 10th this advance has been greatly augmented by an apparent anxiety in London as to future supply. Export demand between October 10th and 23rd resulted in a price advance of 29 cents, to the highest figure at which this product has sold in two years. This price has since been maintained.

OIL JOBBERS' SUPPLIES

Prices based on original packages in large quantities, f. o. b. manufacturing points—unless other wise specified.

Animal, Fish and Vegetable Oils
(Quotations by Falk Company, Chicago)

	Prices Nov. 1	
Lard Oils—		
Prime, bbls., lb.		.15
Extra Winter Strained, bbls., lb.		.13¼
Extra, bbls., lb.		.12¾
Extra No. 1, bbls., lb.		.12¼
No. 1, bbls., lb.		.11¼
No. 2, bbls., lb.		.11
Tallow, prime edible, lb.	.08¼	.08½
Tallow Oil, acidless bbls., lb.		.11¼
Lard Stearine, bbls., lb.	.12¾	.13
Oleo Stearine, bbls., lb.	.11½	.11¾
Neatsfoot Oil—		
Pure, 20 cold test, bbls., lb.		.16½
Pure, 30 cold test, bbls., lb.		.14½
Extra, bbls., lb.		.12¼
No. 1, bbls., lb.		.11¼
Horse Oil, bbls., lb.	.06¼	.06¾
Red Oil, distilled, bbls., lb.		.09
English Degras, bbls., lb.	.04	.04¾
Domestic Degras, bbls., lb.	.04¼	.04¾
Menhaden Fish Oil—		
Light Pressed, bbls., gal.	.54	.55
Yellow Bleached, bbls., gal.	.55	.56
Herring Oil, tanks, coast, gal.	.36	.38
Whale Oil, bleached, bbls., gal.		.75
Sperm Oil, bleached, bbls., gal.	1.62	1.67
Soya Bean Oil pressed, bbls., lb.		.10¼
Soya Bean Fatty Acids tanks, West, lb.	.10¼	.11
Tallow Fatty Acids, bbls., lb.	.07	.07½
Castor Oil—		
No. 1, bbls., lb.		.13¼
No. 3, bbls., lb.		.12¾
Corn Oil—		
Middle West, tanks, lb.		.08
Cooperage, l. c. l.		.09¾
Linseed Oil—		
Carloads, bbls., gal.		.90
Less than 5 bbls., gal.		.94

NAVAL STORES

(Quotations by National Rosin Oil & Size Company, Chicago)

Rosins—		
B to I. bbls (280 lbs.)	6.90	6.95
10-20 bbl. lots, f. o. b. shipping point		7.95
K to WW bbls. (280 lbs.)	6.95	8.25
10-20 bbl. lots, f. o. b. shipping point	8.00	9.40
Turpentine, spirits, ex yard gal.		1.64
In drums		1.69
Rosin Oil, first run, gal.		.47
Rosin Oil, second run, gal.		.51
Rosin, Pitch, bbl.		6.00
Tar, kiln burned		12.50
Tar, retort		11.00

REFINERS' SUPPLIES

Prices are based on original packages in large quantities, and represent spot quotations, unless otherwise stated, f. o. b. manufacturing points.

(Quotations by Wishnick-Trumpeer Chem. Co., Chicago)

Soda Ash, light bags, cwt.	1.75	2.10
Silicate of Soda, 60 deg., tanks, cwt.		1.75
Sal Soda, cwt.	1.10	1.30
Caustic Soda, 76%, drums, cwt.	3.45	3.75
Chlorate of Soda, kegs, lb	.07¾	.08½
Nitrate of Soda, cwt.	2.42	2.45
Potash Permanganate, lb	.16	.17
Potash Bichromate, sacks, lb.	.10	.10¼
Sulphuric Acid, 60 deg., tank cars, ton	.09	.12
Acetic Acid—		
28%, bbls., lb.	.03	.03¼
56%, bbls., lb.	.05¾	.06½
80%, bbls., lb.	.09½	.09¾
Fullers Earth, 16-30 mesh, carloads, ton	23.00	25.00
Chloride of Lime, cwt.	2.00	2.25
Benzol, pure water white, gal.		.32
Benzol, 90%, gal.		30
Toluol. gal.		.30

Indiahoma Applies for New York Stock Listing

St. Louis, Mo.—Indiahoma Refining Company has made application to list $7,500,000 no par value capital stock on the New York stock exchange.

Consolidated balance sheet of the company as of September 30, last, shows cash on hand as $78,837 and notes receivable as $242,901. Investments in oil producing companies is given as $198,929 and leaseholds, oil producing equipment, etc., as $3,741,789 with pipe lines, refineries and other properties as $3,702,418. A surplus of $2,452,282 is indicated.

SPECIFIC GRAVITY AND MELTING POINT OF PARAFFIN WAX

In determining the specific gravity, E. Pyhala recommends the flotation of the wax or jelly in an alcohol-water solution.

The substance is melted and dropped from a glass rod into warm alcohol, care being exercised to note that the drops are free of air bubbles. The drops are transferred to another cylinder and water added until the drops will remain suspended in the alcohol-water mixture without either rising or falling.

The gravity of the mixture is then determined, the gravity of the substance under test is the same as that of the mixture.

E. Pyhala, Petroleum, No. 27, p. 1164.

Serious Shortage of Tank Cars Imminent

A careful study of the traffic situation, material and labor supply, and business conditions in general, both present and pending, forecasts

—increased business volume;
—unprecedented traffic congestion;
—serious car shortage;
—higher prices and delayed deliveries for materials;
—labor shortage.

Orders for tank cars should be placed at once to obtain price and delivery advantages.

Buy

"Car Foundry"

TANK CARS

and be prepared

American Car and Foundry Company

New York	Chicago	St. Louis
165 Broadway	Railway Exchange Building	915 Olive Street

Wherever You Find Gas or Oil

—*You'll Find Bessemer Service*

BESSEMER SERVICE has kept pace with the Oil Industry. Whenever a new field has come in Bessemer has quickly met the opportunity for increased service by establishing in the locality a new service headquarters in charge of a seasoned manager. Today Bessemer Service radiates from the centers listed in the panel to the right.

Find new fields and you'll promptly find Bessemer there to serve you!

THE BESSEMER GAS ENGINE COMPANY

18 York Street — Grove City, Pa.

Branch and Sales Offices

New York, 50 Church St.
T. W. Macartney, Mgr.

Pittsburgh, 1101 Bessemer Bldg.
C. P. Gregory, Dist. Mgr.

Tulsa, Okla., Bessemer Bldg.
F. B. Dunlap, Mgr.

Ft. Worth, Tex., 210 Waggoner Bldg.
B. L. Potter, Mgr.

Newark, Ohio, Newark Trust Bldg.
D. S. Blosser, Mgr.

Shreveport, La., 615 Market St.
A. K. DeFrance, Mgr.

Haynesville, La.
E. L. Nutt, Mgr.

Bartlesville, Okla.
F. D. Sutherland, Mgr.

Ranger, Texas
L. C. Rhoades, Mgr.

Mexia, Texas
L. E. Scaggs, Mgr.

Parkersburg, W. Va.
608-607 Union Trust Bldg.
W. S. Bole, Mgr.

Bremen, Ohio
C. A. Rice, Mgr.

Logan, Ohio
R. S. Ruble, Mgr.

Winchester, Ky.
J. F. Bonnell, Mgr.

Bowling Green, Ky.
C. H. Tegmeyer, Mgr.

Los Angeles, Cal.
The Smith-Booth Usher Co.

San Francisco, Cal.
50-60 Fremont St.
The Smith-Booth Usher Co.

Minneapolis, Minn.
The Power Equipment Co.

Philadelphia, Pa., 504 Arch St.
The Gas & Oil Engine Co.

Boston, Mass., 94 Pearl St.
The F. H. Hayes Machinery Co.

Tampa, Fla. and Jacksonville, Fla.
Cameron & Barkley Co.

Columbus, Ga.
Lummus Cotton Gin Co.

Charlotte, N. C.
Lummus Cotton Gin Co.

Memphis, Tenn.
Orgill Bros. & Co.

Dallas, Texas
Lummus Cotton Gin Sales Co.

Stuttgart, Ark.
The Layne & Bowler Co.

Crowley, La.
The Layne & Bowler Co.

Denver, Colo.
M. J. O'Fallon Supply Co.

Joplin, Mo.
McNeal Machinery Co.

Casper, Wyo.
The Casper Supply Co.

Lodi, Ohio
W. F. Glass

Chanute, Kansas
Western Drilling Tool & Supp. Co.

St. Louis, Mo.
1960 North Broadway
Corby Supply Co.

Omaha, Neb., 3510 Charles St.
B. R. Hawley

Toronto, Ont.
Canadian Allis Chalmers, Ltd.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS — VACUUM PUMPS – ROLLER PUMPING POWERS